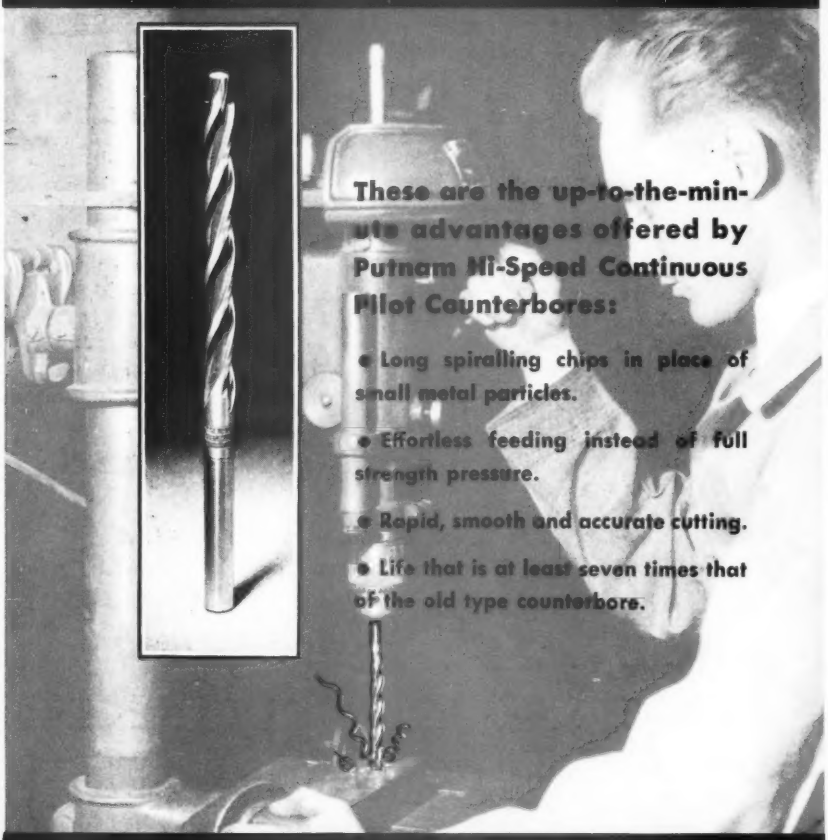
The TOOL & DIE Journal
Tool-Die-Machine PROGRESS

Continuous Pilot COUNTERBORES GIVE YOU TRUE PRODUCTION ECONOMY



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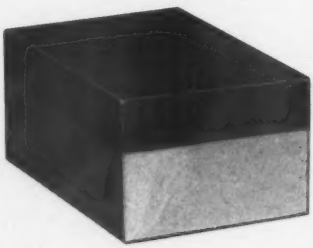

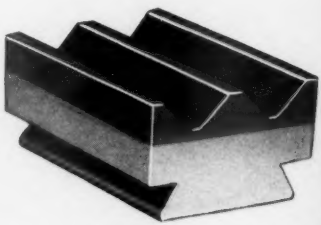

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Contents

Vol. VIII, No. 2 May, 1942

Letter from Washington—*George J. Huebner* 37

Finishing Methods and Equipment for Molded Plastics 38–99

Causes and Cures for Die Spring Breakage 42

Magnetism in the Tool Shop—*R. B. Annis* .. 43–82

Reclamation of Vital Alloys 46

Typical Designs for Drilling Jigs and Fixtures—*C. W. Hinman* 47–49

A Good Workman is Known by His Chips .. 52–53

Progress on Parade 72–73

Publication Previews 98–99

Shop Aids 106

Buy With Confidence 110–118

Contract Shops 122–123

Advertisers Index 125

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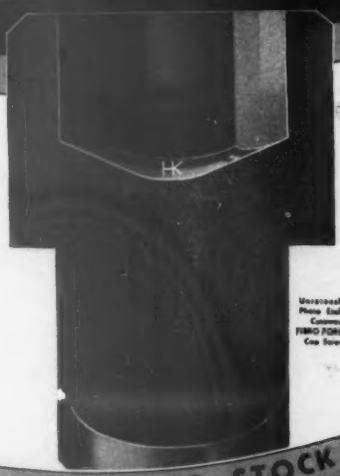

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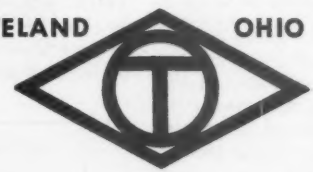

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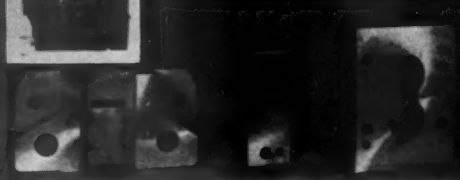

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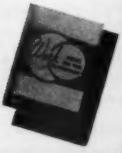

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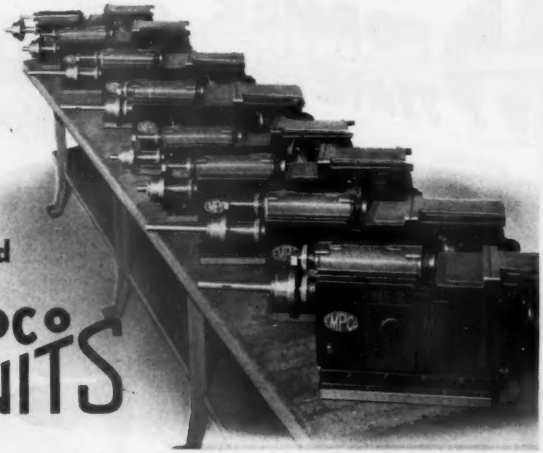

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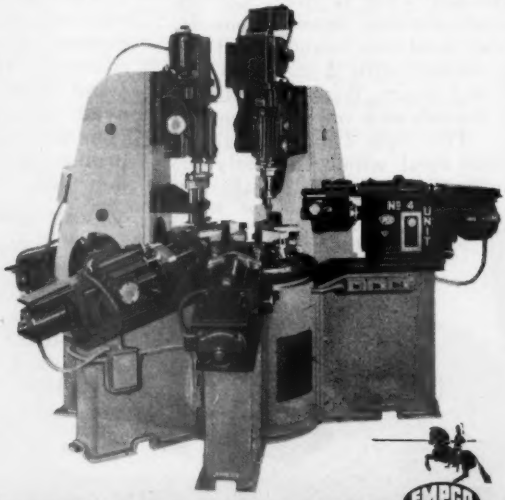

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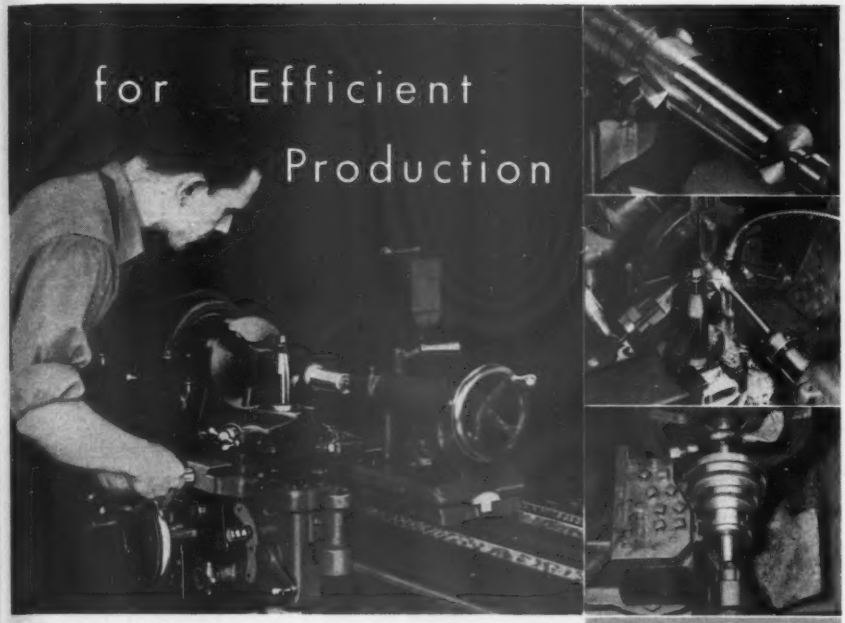

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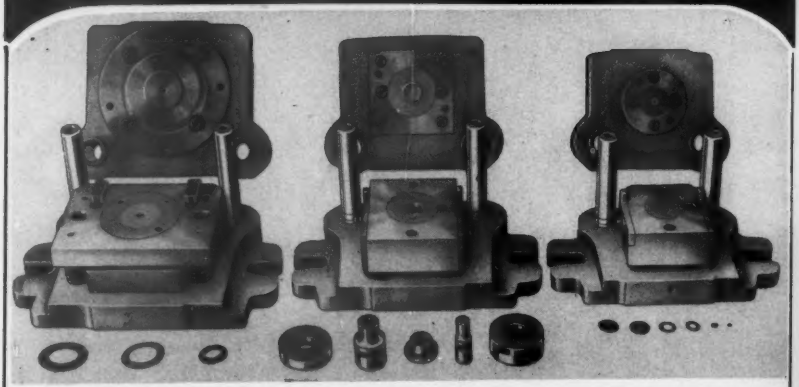

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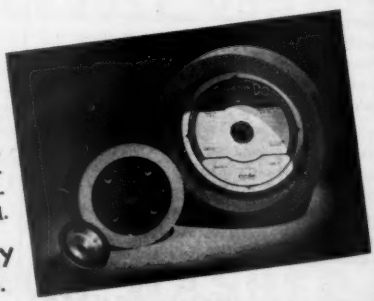

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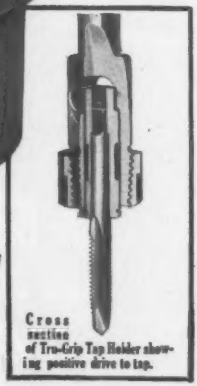

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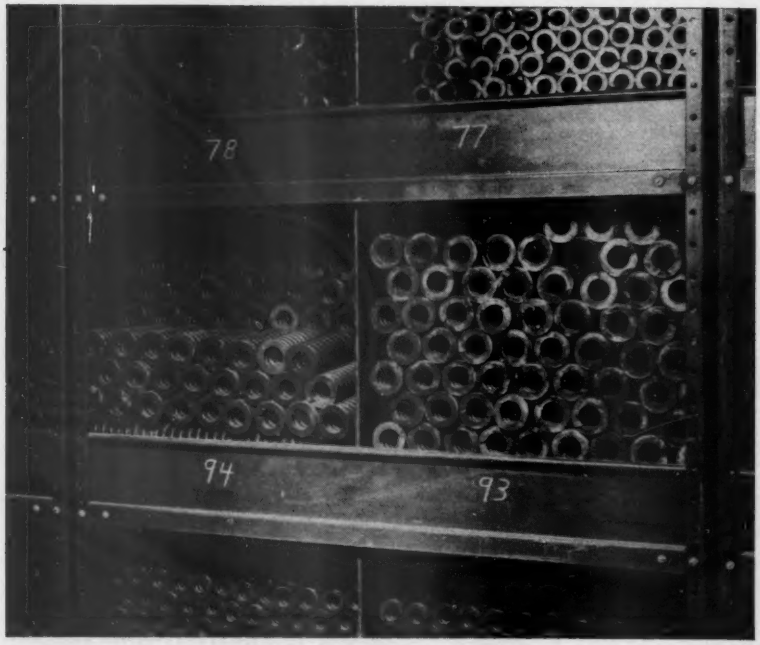

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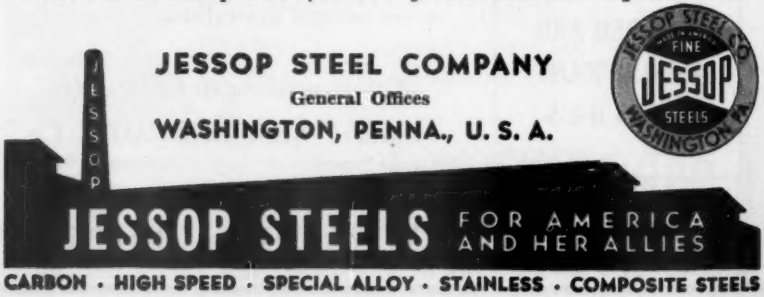

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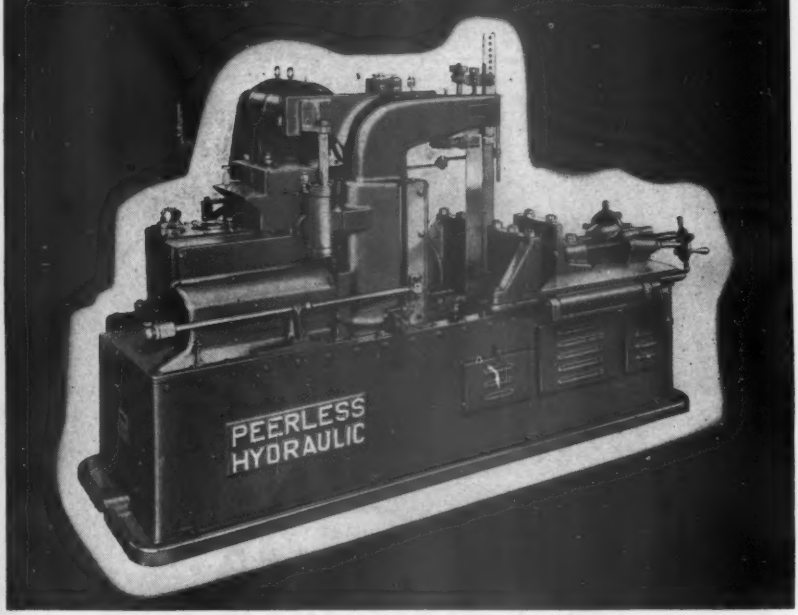

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Machines that save time for tool and die makers are making an important contribution in assuring a defeated enemy. Boyar-Schultz Bench Model Profile Grinder No. 1 is a machine tool designed for just that purpose.

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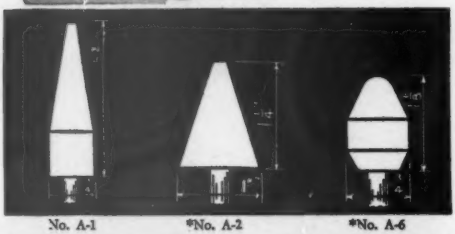
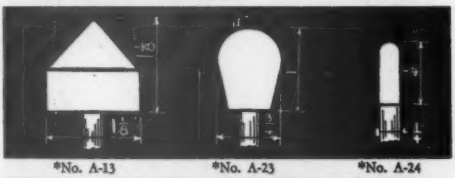


No. A-1 *No. A-2 *No. A-6



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For faster, vibrationless precision grinding, investigate the DoAll, the grinder that's years ahead in all-around performance and accuracy.

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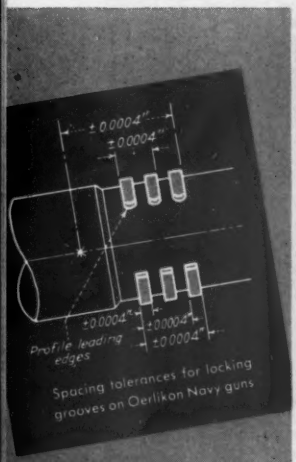
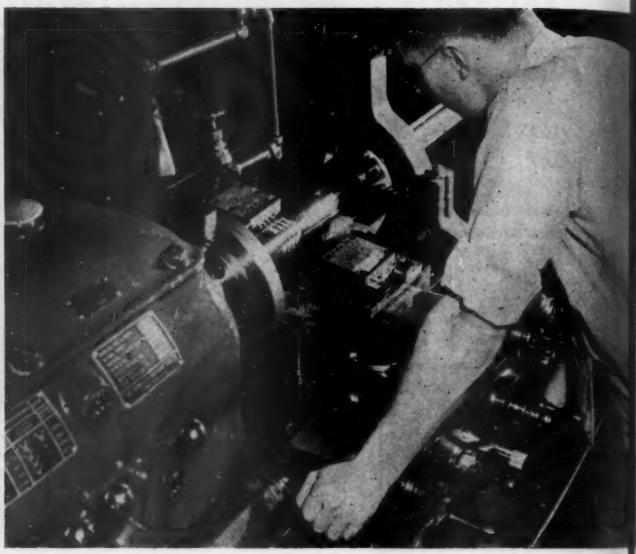
DEPT. TD, SAVAGE, MINN.

Formula

FOR ACCURACY ON OERLIKON GUNS



Spacing tolerances for locking grooves on Oerlikon Navy guns



Two interchangeable barrels are required for each Navy Oerlikon gun being built by a large automotive manufacturer. To lock properly in the breech casing, each barrel has three interlocking grooves, which must be turned to accuracy limits of 0.0008". Actually, the work is produced within limits of 0.0004".

Steps in the operation consist of:

1. Milling interruptions before grooving to prevent heavy burr being thrown up between grooves. Also, since grooving chips are no longer than the length of the groove, they cannot carry around with the work.

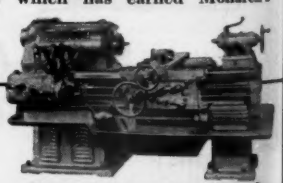
2. Turning grooves on a Monarch 16" x 78" Model W Lathe. This is equipped with a special cross slide which mounts front and rear tool blocks and feeds to positive stops. Tools are fitted tightly into blocks, with hardened spacers to maintain accuracy.

Tools are purchased 0.001" oversize for width and are lapped to half a tenth in the plant toolroom, with extreme care to maintain size and clearance angles, with keen edges free from minute nicks. Tool setting is checked with master gage to a 0.0002" limit for spacing and cumulative errors.

After tool blocks and positive stops are set, the work becomes almost completely automatic on this type of Monarch Lathe. This is the same basic design which is used extensively in the automobile industry for piston grooving, and that has proved its worth for so many years in its accuracy and unfailing performance.

Again, we point out that regardless of increase in the production of Monarch Lathes for war implement use, we tolerate no letdown in the quality which has earned Monarch's reputation.

THE MONARCH MACHINE TOOL COMPANY · · · SIDNEY · OHIO



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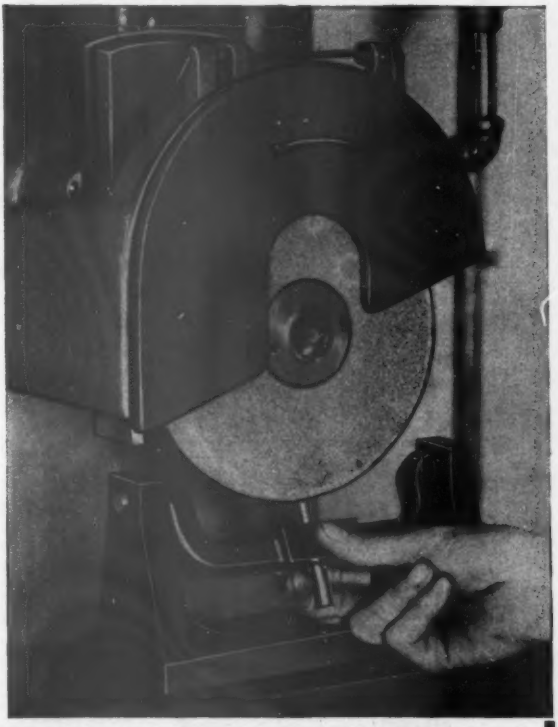
The "LITTLE WONDER" RADIUS DRESSER will dress radii from 0 to 1" quickly and conveniently. This is a time-saving device for every grinding room. May be simply and accurately set by micrometers or gage blocks. It does not contain bearings which may become clogged with emery. It will dress either convex or concave radii and is free from chatter.

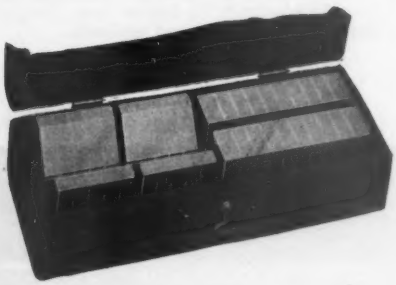
Price, $39.50.
Cold set dressing tool, ⅓ carat, $6.50.

Place your order now subject to approval and actual trial in your shop.



ELIMINATE SPECIAL CLAMPS and HOLDING DEVICES WITH MAGNE-BLOX

The MAGNE-BLOX set illustrated consists of two parallels measuring 1"x1¼"x3¼" and two V-blocks measuring 1¼"x2⅛"x1⅞". This set has been designed for holding work for surface grinding operations that cannot be placed directly upon the plane surface of the magnetic chuck itself.



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DIE DESIGNING AND ESTIMATING

CONTENTS

New Chapters Added, including:

Progressive Dies

Compound Dies

Drawing Dies

(Deep drawing section on cartridge case design, mathematical and graphical methods of determining diameters, shell wall thicknesses, punch and die sizes)

Outline of Equipment and Operations for Manufacture of Small Arms Cartridge Cases

15 New Estimating Tables

Separate Index of Time Value Tables

150 Practical Points on Die Designing and Building

"WILL be extremely helpful to us . . . .", "very practical", "even better than I had hoped it would be"—these are comments by men in the precision tooling industry who have examined the new second edition of "Die Designing and Estimating". Orders for 50 copies (most on a second order after the book was reviewed) from a public library, 28 copies from an airplane manufacturer, 24 from an apprentice training instructor testify to the usefulness of this book. Largely written on request by specialists, the book covers its subject concisely, systematically and with authority.

The 160 pages have over 125 drawings, charts and photographs carefully selected to illustrate modern die designing practice. The estimating data (largely that of George Dannes) is complete enough to follow from rough sketch to a final, sound estimate.

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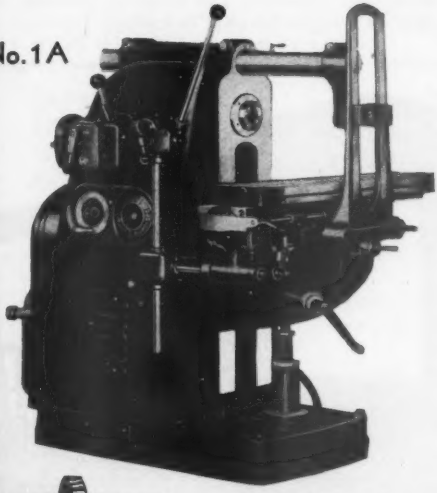
WITH *MICRO-SPEED DRIVE*

No. 1A



Here's the ideal milling machine for small parts production. The Micro-Speed Unit, mounted inside the streamlined column (as shown in inset) provides the operator with a wide range of spindle speeds. Selector Dial Control selects the desired speed instantly, at the turn of the handwheel adjacent to the dial on the column. All Controls On One Side of Machine for Easy Access.

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SPEEDS—56 to 630 R.P.M. Equipped with Spindle Brake. *RANGE OF FEEDS*—Longitudinal, 34"; Cross, 8"; Vertical, 18½".

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There is less need for crane or special equipment in transporting or installing fixtures made from this amazing, semi-plastic material. It's only one-sixth the weight of steel yet durable and strong enough for all production assembly requirements.

Masonite Die Stock makes possible low-cost fabrication. It can be drilled and tapped for threads for attaching clamps and gauges. Also press fit drill bushings can be inserted.

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Masonite Die Stock is available in thicknesses of ¼ to 2 inches . . . in sizes of 48 x 72 inches and 48 x 144 inches. For further details, fill out and mail coupon.

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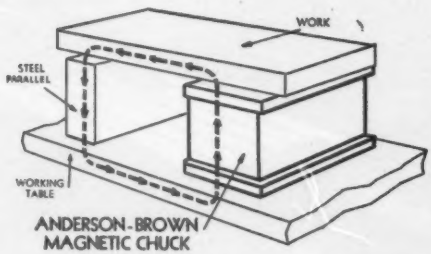
Anderson & Brown Magnetic Chucks

MAGNETIC BODY FLOW is the powerful magnetic flux that flows from the magnetic chuck, locking tightly the work, the parallel, and the magnetic chuck to the working surface of the grinder.



QUICK SET-UPS, extreme flexibility and wide adaptability are now possible, thanks to Magnetic Body Flow, with its intense holding power.

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Anderson & Brown Magnetic Chuck is also a demagnetizer. Work is automatically demagnetized as it is removed from the grinder. It may also be used as a portable demagnetizer.

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This special 7-spindle machine was designed by our engineers for the mass production of saddles for Milwaukee Milling Machines . . . a higher degree of accuracy was obtained than by previous methods . . . and production was increased 350 per cent.

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Milwaukee MILLING MACHINES

Milwaukee MILLING MACHINES

The TOOL & DIE Journal

MAY, 1942 Vol. 8, No. 2

Letter from Washington

By George J. Huebner

Free Men In Action

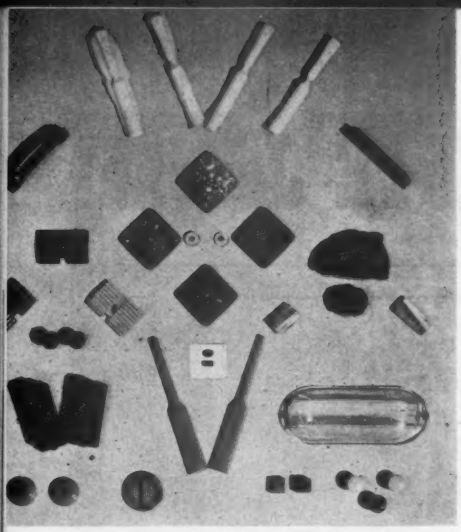
AS we write this month's Letter from Washington, we are receiving from the Far East theatre of war reports of a naval engagement which is in the finest American tradition. Our Navy and Air Force have dealt a Japanese invasion fleet a blow so severe that it may turn out to be one of the war's decisive engagements.

The first reason for such a victory will be the sterling qualifications of the American officers and men on the battle line—free men all, fighting for a mighty principle. The second reason, one equally important, will be the sterling quality of fighting equipment, likewise made by American free men in factories operating under the American system of free enterprise. There we have an unbeatable combination.

During the few months we have been writing this letter from the Nation's capital, we have seen our Country's military status become one of all-out arming for offensive war. To accomplish it, the world is witnessing an industrial effort which will go down in history as the mightiest achievement of an aroused democracy. Directed by the War Production Board, this effort will be to the everlasting credit of industrial management and labor, which is attaining in months the goals which even the most belligerent totalitarian nations required years to reach.

Chairman Donald Nelson of the War Production Board has said that we are over the hump. We take that to mean that much of the heartbreaking effort of planning, tooling, acquiring equipment and assuring raw materials is back of us, at least for most of the principal suppliers. Now we stretch out for records of production to achieve the President's goals. Thus it will be proved when a nation of free men and women individually pledge to give their best efforts, aye, even to give themselves if necessary, "right makes might."

Therefore, we shall succeed.



Finishing Me

Equipment For Mo

Plastics materials are rapidly gaining prominence in our War Production Program. New designs and production techniques enable manufacturers to utilize plastics fabrication in military and naval as well as civilian production.

Experienced users of metal are encountering finishing problems in the production of plastics pieces. The following article is the first of a series compiled by the editors of The TOOL & DIE Journal. Finishing methods and equipment for molded plastics are discussed in an effort to assist the inexperienced as well as to suggest some new ideas to the older plastics processors.

—The Editor

***Top*—A group of small plastics pieces ground and finished by wet grinding.**

***Bottom Left*—Wet finishing on a plastics piece — insert shows flash before grinding.**

***Bottom Right*—Wet and dry abrasive machine for grinding and finishing.**

FINISHING operations on molded plastics parts often require as much time as the molding operations proper. Many of these operations are simple ones which can be performed on the standard types of equipment which should always be available in the finishing department. Nevertheless, the plastics engineer usually has to spend a considerable amount of time designing finishing fixtures to supplement such standard equipment to assure maximum speed and accuracy. While a mold should be designed to minimize the amount of finishing, the cost of the mold and the resulting molding operation should be weighed against the finishing costs and all other requirements of the finished piece. Because finishing operations are so important in the production of molded plastics, it is

Methods and Molded Plastics

necessary to understand the principles of finishing in order to have the complete background for mold designing.

The ordinary finishing operations are edging, drilling, tapping, broaching, turning, polishing, assembling and painting. These operations will be discussed with respect to standard equipment, special attachments, accuracy limits, quality of finish produced, production rates and other important factors.

Edging

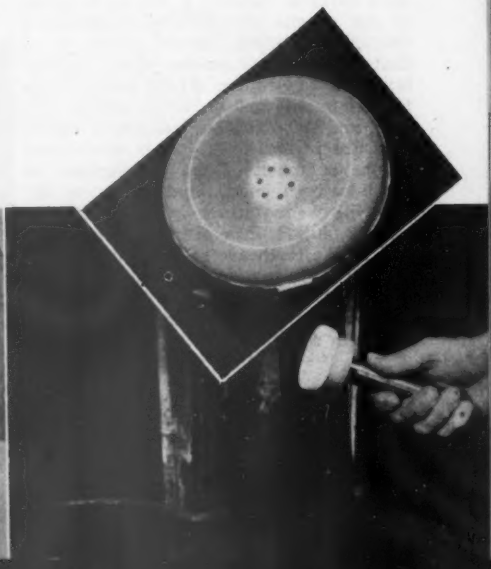
The operation of removing flash from molded plastics parts is called edging. Thermosetting materials are characterized by brittle flash, and thermoplastics by rough, rubbery flash whose tendency it is to seize and gum if heated by the cutting actions. Therefore, methods for edging the two types of materials usually differ in detail although in general they may be similar. Edging can be accomplished by tumbling, filing, grinding and by the use of flash trimming dies.

For hand filing, a few different types and sizes of files are effective for most surfaces and provide the proper cutting action. Perhaps the most generally useful edging file is a second-cut full oval file about 8" long. Its fine sharp teeth cut thermosetting materials rapidly and smoothly and the double oval faces keep the edges of the file off the work and

Top—Heavy flash surrounding molded teeth before trimming.

Bottom Right—Wet belt method of grinding and polishing with a flexible belt.

Bottom Left—Wet and dry abrasive machine for grinding and polishing.



Octagonal tumbling barrels in which small plastics parts are frequently finished saving the more costly operation of hand buffing.

allow smooth blending of the file strokes. For filing straight lines, second-cut pillar files are useful. When heavy industrial moldings, often made of asbestos or fiber-filled materials, are edged, bastard-cut pillar, square and round files are efficient. Round files of second-cut or bastard-cut are useful for large openings where radii are too small to be filed by the oval file. Triangular files with the teeth ground off are useful for reaming *light* flash from small round holes.

Edgers should be taught the correct method of using a file to obtain maximum production speed and file life along with suitable finish. A file is designed to cut in one direction only, therefore the pressure stroke should always be in that direction. Pressure should be relaxed on the return stroke because the file teeth will not do much useful cutting, and they may be damaged if heavy pressure is employed. It is economical to use as much of the file surface as possible, both length and width, so the file will wear uniformly and will not become dulled in one place while the rest of the teeth are still sharp.

In filing flash from pieces made of thermosetting materials it is considered the best practice to break the flash toward a solid portion rather than away from the main body. This prevents chipping the *finished* piece. The file is used to best advantage when pushed with a firm stroke which first breaks off the flash close to the body and then cuts the remaining flash down to the line desired. File marks on thermosetting materials can be kept almost indistinguishable and in many cases no additional finishing operation is required or at most the wiping of the filed surface with an oily cloth to bring out the luster. When wide areas are filed, however, it is necessary to go further to obtain luster.

Tool marks generally are more visible on thermoplastics, and a fuzzy burr is often produced. These tool marks and burrs can be removed in subsequent operations. Thermoplastics flash cannot be broken easily, but it can be bent against the body portion and filed through close to the line. An additional file stroke usually will remove the remaining portion of the flash.

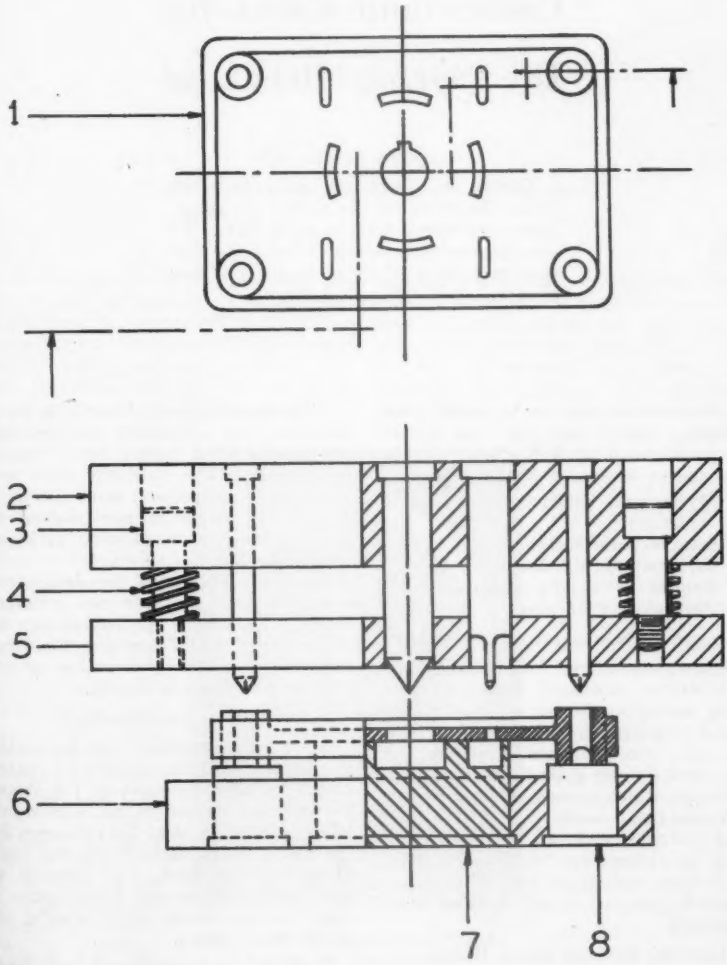
Irregular shapes are usually edged by hand filing at a bench. When round work is to be edged, it is economical to set up the operation on a bench type edging lathe. Such a lathe should have the head and tail spindles driven at the same speed and the tail spindle arranged to slide toward the head to clamp the piece between two rotating adaptors. Usually the head adaptor drives the piece by friction or other convenient means and the tail adaptor prevents it from wobbling under the pressure applied by the file.

(Continued on Page 93)

Abrasive band grinder for finishing both metal and plastics materials.

Flash Trimming Die For Phenolic Molded Part

(Die Set Is Not Shown)



Principal Parts of the Flash Trimming Die

1. Plan View of the Part.
2. Top Punch Retainer.
3. Stripper Bolt (4 Required).
4. Stripper Spring (4 Required).
5. Stripper Plate.
6. Bottom Retainer.
7. Lower Back-Up Block.
8. Pilot Pin (4 Required).

Causes and Cures for Die Spring Breakage

During a recent campaign to track down the cause of die spring breakage, these interesting facts came to light. We are passing them along in the hope that they will prove of value to many of our readers.

—The Editor

IF die springs continue to break, even after a day's run, the real causes may prove hard to find. Some of the many causes of spring breakage are:

1. Hydrogen embrittlement due to plating
2. Incorrect die design
3. Incorrect spring size
4. Rapidity of spring compression
5. Poor quality of wire

Hydrogen Embrittlement in Die Springs

Electro-platers have found that hydrogen is driven into steel during various plating operations. Some types of cleaning and pickling can also drive hydrogen into steel. The hydrogen surrounds the grains and sets up a strain in the grain boundaries which causes springs to fail under less rated loads.

The embrittlement can be removed by baking the springs for two hours at 400° F. and then cooling in air. This is an inexpensive operation and will not hurt the plating.

Incorrect Die and Spring Design

Much die spring breakage comes from within the design of the die or of the spring itself. Insufficient clearance between the outside of the spring and the guide hole in which the spring operates can cause breakage. The reverse situation when the guide hole is too large and permits "buckling" or "bellying" of the spring can also cause breakage.

If springs designed for only a medium deflection are repeatedly compressed to near their solid height early breakage will result. The rapidity with which springs are compressed must also be considered as many of our modern high speed presses now require springs of special design.

In such instances, a die designer and a spring manufacturer can collaborate on the design of a special spring. Such a procedure would pay for itself many times over in the elimination of shutdowns or damage to the die.

Other Considerations

Other considerations are the methods of cleaning and the quality of material used. An alkaline solution for cleaning the springs instead of an acid solution will eliminate some of the hydrogen from the steel. Much depends on the quality of spring wire used. The common wire used in cheap springs have seams and other defects which cause trouble, especially when plated.

It should be remembered that "stock" die springs are, of necessity, designed for the average application and sometimes may not be satisfactory for use in installations which impose exceptionally severe stresses. Many considerations enter into the correct selection of springs for a given die and these considerations should be carefully analyzed before a decision is reached.

Magnetism in the Tool Shop

By R. B. Annis
Chief Engineer, R. B. Annis Company

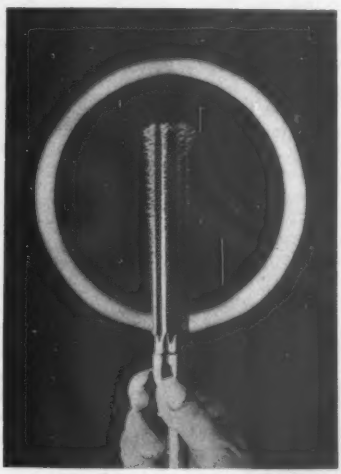
PRODUCTION in tool shops and in the metal fabricating industry has reached an all time peak and accompanying this intense growing activity comes a natural shortage of material, men and hours. Anything that will save on these basic production items will result in increased output and speed war production.

Magnetism needs no "priority", you already have it in your shop; some times performing useful duties but more often as the unsuspected, invisible force that causes many annoying delays and shutdowns.

A brief review of the underlying principles regarding magnetism may assist the shop man to better understand and control this mysterious something that exists all around him.

The ancients in the province of Magnesia, Asia Minor, discovered an ore that had the peculiar property of attracting pieces of iron. This ability to attract iron was called magnetism and the name magnet was applied to any piece of ore possessing this property.

A magnetic substance is one that is forcibly attracted by a magnet or one that is capable of being magnetized. Of the hundreds of substances surrounding us very few are pronouncedly magnetic: lodestone, steel, iron, nickel and cobalt are all magnetic to more or less a degree. Various alloys of these metals also show magnetic properties. Substances such as wood, glass, fiber, mica, asbestos, cloth, copper, lead, aluminum and gold, etc., are considered non-magnetic in as much as they are not capable of becoming magnetized. Also certain combinations of two normally magnetic substances, iron and nickel with chromium, are also non-magnetic. These special alloys are our familiar full stainless steels.



A "halo" of magnetized filings along cutting edges.

Although the above and many other substances may be considered as non-magnetic, there is no known "insulator" for magnetism. A magnetic field will penetrate and attract through wood, bakelite, mica, copper, etc., the same as though these non-magnetic materials were replaced with air. Objects may be shielded from magnetic effect somewhat by by-passing the field through an easily magnetizable, soft iron shield of sufficient thickness to offer an easier path for the disturbing magnetic field than through the object being protected.

Abrasive particles clinging to the magnetized cutting edge.

Induced Magnetism

Whenever a piece of iron or steel is placed in a magnetic field, it also becomes magnetized and within certain limits the stronger the magnetic field, the stronger becomes the induced magnetism in the iron or steel.

When the magnetizing field is removed from a piece of pure soft iron, that exhibited full magnetic properties while in the magnetic field, it will be discovered that the iron has lost its temporary magnetic qualities and there is no remaining or residual magnetism. If, on the other hand, a piece of steel, an alloy or pure iron and carbon, is treated in a similar manner, it will be discovered the steel retains magnetic qualities after the magnetizing field is removed. Generally speaking, the harder the steel, the more residual magnetism.

This property of hardened steel is very useful for some purposes and various steel alloys with carbon, tungsten, chrome, nickel and cobalt are used in making efficient artificial or permanent magnets for use in electrical instruments, compasses, loud speakers, etc. These steel alloys with some additional variations are the same steels used every day in the tool room.

Steels Used in Tool Rooms

HIGH CARBON STEEL—Drill Rods, Drills, Taps, Hand Reamers

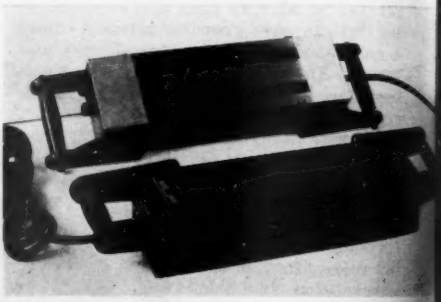
TUNGSTEN STEEL—Tool Bits, Drills, Taps, Machine Reamers, Gages, Forming Dies

CHROME, NICKEL, COBALT STEELS, ETC.—Embossing Dies, Intricate Punches, Mandrels, Extrusion Dies, Gages

Practically all of the tools used and made in the tool room today are composed of steel alloys that are strongly magnetic and carry a strong residual. In other words, they would make good permanent magnet material. These tool steel alloys, however, were developed for their various mechanical properties of hardness, toughness, wear resistant, non-warping, machinability, etc., and their magnetic properties are only incidental.

Magnetic Fields Ever Present

Magnetic fields are everywhere in the shop. First of all is the ever present earth's magnetic field which, although relatively weak, is nevertheless easily observed and produces more or less of a cumulative effect by inducing magnetism in steel sections that are subject to vibration or heating and cooling cycles when they have an appreciable length in a direction parallel to the earth's field.



Portable surface type demagnetizer for work that cannot be readily moved.

The punch press stands vertically and subjects the hardened steel punch and die to high frequency vibration over long periods of time; practically a perfect setup for cumulative magnetization.

Wherever an electric current flows, the magnetic effect is also present, the stronger the current the stronger the magnetic field. By allowing this same current to flow through a number of turns, as in a coil, the magnetic effect is stronger in proportion to the number of turns of the coil.

Large motors or other equipment drawing heavy current produce magnetic fields

around themselves and their power supply lines. Steel may become magnetized when near this equipment, particularly when the supply is direct current. This same affect is also noticed on AC circuits that are switched on and off. Spot welders, for instance, have a very strong magnetic field extending some distance around their heavy current secondary welding circuit.

A piece of hardened steel brought in contact with a permanent magnet or another magnetized steel part will, in turn, become magnetized. This property can be passed on from piece to piece in decreasing amounts.

Magnetic Chucks

Magnetic chucks are the most commonly recognized source of magnetization in the shop. The magnetic chuck's chief advantages lies in the fact that it can be used as a permanent fixture,

Demagnetizer equipped with adjustable pole pieces.

handling a wide variety of work without changing or loss of time.

These magnetic chucks are designed to hold the work tight by inducing a strong field of magnetism in the work itself. Non-magnetic materials, therefore, cannot be held on a magnetic chuck. If the work is hardened steel, the residual magnetism remaining in the steel after the chuck is turned off makes it difficult to remove the work from its chuck.

Magnetic Effect on Cutting Tools

The effect of magnetization on the cutting action of tools is probably most easily seen in the drill press. The combination of a magnetized drill and a deep hole in iron or steel is a real problem; a broken drill is generally the result unless the operator uses extra precautions, clearing his drill often as the hole gets deep. If the operator does succeed in "jockeying" the hole through, it is very apt to be rough and somewhat oversize.

Magnetized drills and cutting tools bind, heat and dull long before they normally should. Clinging particles mean dull equipment. Look out for trouble whenever tools are magnetized sufficiently to gather a "halo" of filings along the cutting edges.

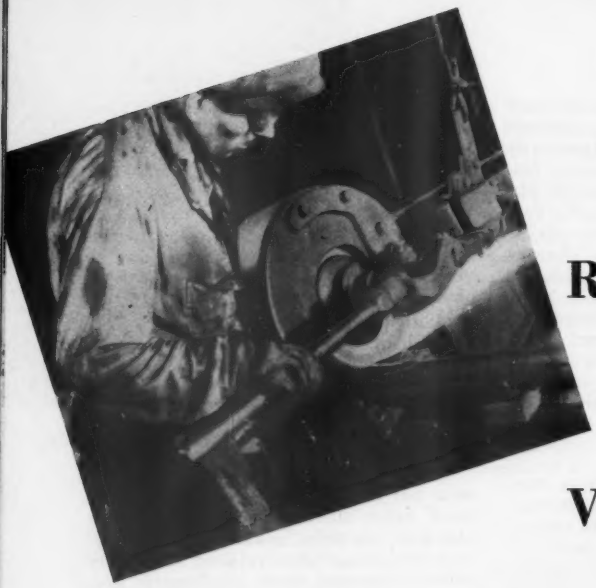
The scale or oxide coating found on most hot rolled steels breaks into small hard flakes during machining. These abrasive particles clink to the magnetized cutting edge, rubbing constantly between tool and work, resulting in premature dulling. Punches and dies are subject to the same abrasive actions while punching these materials; this results in short runs between grinds and subsequent short tool life.

Solutions to Magnetic Problems

What can we do in the practical shop to prevent some of these troubles due to magnetism? The wires or cables leading to large motors and furnaces should be close together and preferably inside an iron conduit which acts more or

(Continued on Page 80)

10″ demagnetizer offers efficient cooling and protection.



Reclamation of Vital Alloys

ALLOY steel producers, who work with the more valuable and hard-to-get materials of steelmaking, have always found it expedient to closely guard their consumption of these vital alloy metals.

Salvaging Important

Salvage is a very important part of this economy. For example, since 1932 it has been standard procedure with the Allegheny Ludlum Steel Corporation to salvage valuable alloy metals from such a seemingly insignificant source as the grindings produced in manufacturing operations on the steels.

Their engineers have done much research on this subject during the past ten years, and as a result, special equipment and procedures have been developed. In recent peacetime years, all of the tungsten in grindings was captured and returned to the electric furnaces for remelting. The grindings from low-alloy steels were also processed for reclamation, even though the expense of salvaging their contained alloys did not at that time justify the salvaging cost.

War Makes Reclaiming Necessary

Now, however, under war conditions no strategic element can be allowed to escape, and Allegheny Ludlum's persistence in establishing methods of reclaiming low-alloy grindings is bearing fruit—particularly since most of these steels contain our currently most essential alloys, nickel and chromium.

New Reclamation Plant

To increase its salvaging capacity, the company is building a new reclamation plant which will concentrate on the processing of low-alloy steels to save the alloy content. To eliminate losses of these alloys until the new salvaging equipment is in operation, the company has contracted with several other concerns, who are supplementing Allegheny Ludlum's present facilities for recapturing the strategic alloy particles from alloy steel grindings.

Typical Designs for Drilling Jigs and Fixtures

Part V

By C. W. Hinman
Designing Engineer

DESIGNING a jig for drilling holes around the surface of a cylindrical piece of work is an order that any tool designer might have to solve. The work piece may be a length of round solid shaft or perhaps a length of pipe. It may be a drawn cup or a solid blank, the height or thickness of which is less than its diameter.

The work diameter may be so large and the angles between holes so acute, that to provide jig feet opposite the holes to be drilled is impractical and the subsequent addition of other radial holes at various angles with existing holes would be quite impossible in such a jig.

To solve such designs as these, it is apparent that we must resort to using a cylindrical type of jig and that it must be revolved in a cradle to "index" the various hole centers into vertical positions under the spindles of a drilling machine. Furthermore, it is seen at once that a rotary jig will permit adding other holes at various positions and at any angle from existing holes.

Cylindrical Jigs and Cradles

Fig. 7 illustrates a cylindrical jig and cradle for drilling two different lengths of relay covers *A* and *B*. The work piece is welded steel tubing and has been counterbored at both ends in a previous machining operation. It is necessary to register this piece from the counterbored holes and to clamp the machined ends of the pipe. The jig body is cold drawn steel tubing and the assembly construction is as follows.

Construction of a Cylindrical Jig

Bottom plate *C* is welded on one end of the jig body. A nut secures stud *D* against the face of a four point gage *E*, which in turn is "doweled" centrally on the inner face of *C*, as shown. At the opposite end of the tool, plate *F* is an easy sliding fit within the jig body and is provided on its face with a four point gage plate similar to *E*. Both of the four point gages enter the counterbored diameters at the ends of the work with easy sliding fits, but they do not register in the bottoms of the counterbores. This provision causes plates *C* and *F* to clamp the work securely between them when wing nut *G* is tightened.

When the shorter work part *B* is to be clamped and drilled, a spacer block (not shown) is inserted between *F* and *G*. The tool can be revolved in the "V" of the cast iron cradle block and hardened strips *H*, shown attached in the "V," take the wear.

Plate J is attached across the left end of the cradle. This plate carries a positively mounted pin which can be engaged in any one of the circle of bushings shown in plate *C*. The pin is engaged by simply sliding the jig in the cradle toward the right and then moving it toward the left, thus engaging the next bushing.

Removing "Drill Burrs"

When drilling holes through the walls of a pipe, there will be large "burrs" where the drill points break the wall to complete the holes. After drilling, a

"burring" operation will be found necessary. In this case, the burrs are ground off with an internal grinding wheel mounted on a long arbor or cut off with a long spiral milling cutter similarly mounted.

Tool Designs and Simplicity

All tools should be of the simplest designs possible. If practical, use cast iron stock or machine steel instead of designing a pattern and then waiting for patterns and foundry castings. Use commercial structural shapes wherever possible. Avoid using unnecessary screws, dowel pins and other parts that add nothing to the utility of the tool. Do not counterbore for fillister headed screws if avoidable. Design the parts to permit easy machining and grinding. It is possible in most cases to design tool steel parts of shapes that distort the least after hardening. Non-cutting parts that take wear can be of machine steel and case hardened, or of chilled cast iron or cast steel. Some shops have a rule: *Never use tool steel for parts that carry no cutting edges.* Commercial bolts and screws can often be used for draw rods or for clamping and locking mechanisms. Use cold rolled steel plates with their commercial sizes left intact, wherever possible. "Break sharp corners," but do not specify useless large radii which waste time to make. These, and other time-saving stunts, save thousands of dollars in just a few months' time. Let us not forget that the best tools are the simplest.

Combination Drilling and Milling Fixture

A simple and cheap fixture which can be used for a variety of parts is illustrated in Fig. 8. The drawing shows an end view of a universal vise designed for clamping various lengths of commercial sections which are composed of different shapes and sizes. This vise can be used for either drilling or milling. For drilling, the bushing plate *K* is attached and the blocks *L*, which fit the table slots when milling, are removed. The jaws will grip triangular sections, rectangular, square, hexagonal, round, angular, channel shapes and other sections. The vise is shown here set up for milling a horizontal and vertical slot along one side and end of the round piece of work seen at *M*. If only a few

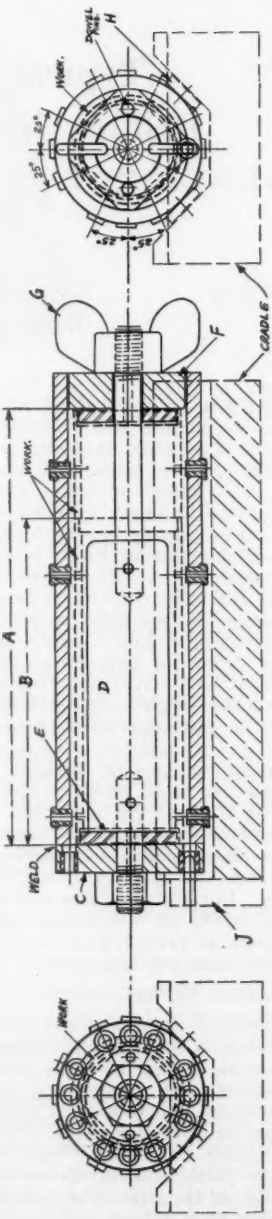


Fig. 7. Typical design for a cylindrical drilling jig and its cradle.

Fig. 8. Design of an efficient vise for either drilling or milling.

parts or a mass production of interchangeable parts were to be milled or drilled in the toolroom, this convenient tool is available.

Body *N* is of cast iron or steel stock for which no pattern is required; it can be made of a scrapped block found laying around the shop. Clamp *O* is of machine steel cyanide hardened and the clamping draw rod is a commercial ¾ in. diameter bolt. A half turn of nut *P* releases the work for reloading the vise.

There are numerous commercial clamps which may be used for similar purposes, but none of them have the capacity or range for clamping as many different shapes and sizes of work as this one.

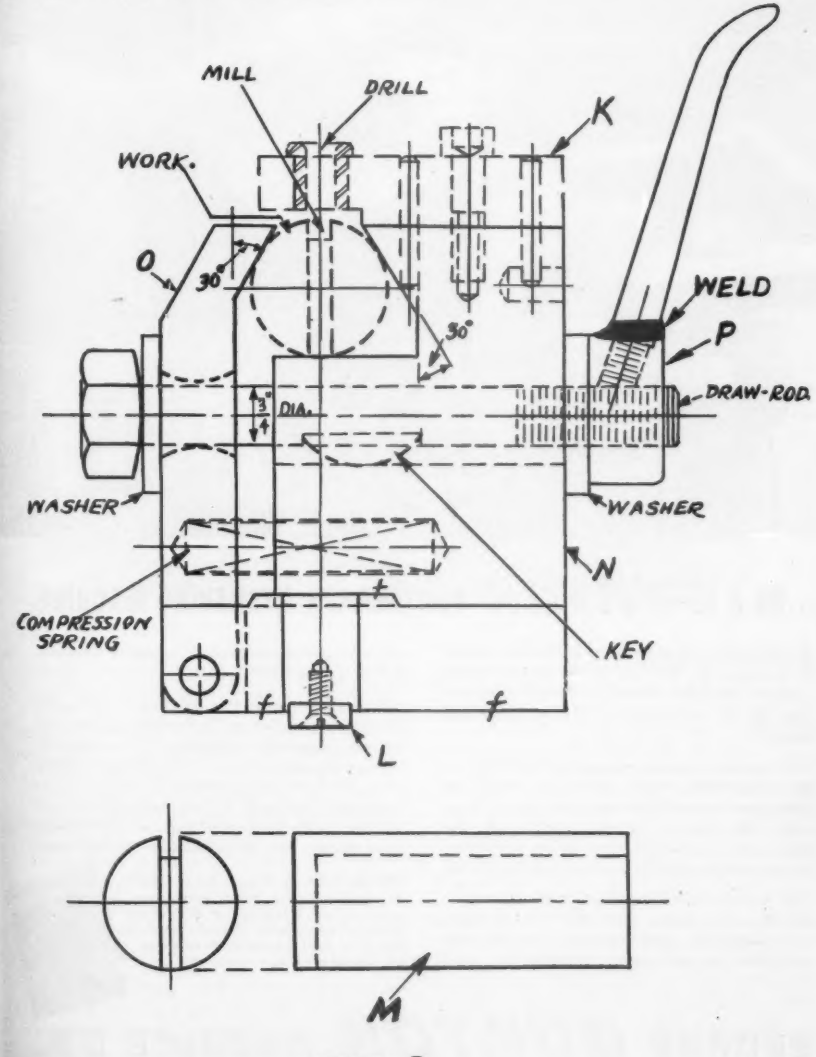


FIG.-8

100 Name Plates ENGRAVED in 12 Hours . . . .

Engraving Template

...ON A GORTON PANTOGRAPH ENGRAVING MACHINE

ENGRAVING 100 name plates in 12 hours without resharpening the tool, at the Barber-Colman Company, Rockford, Illinois, is a typical example of what can be produced on a Gorton Pantograph Engraver.

The operator is shown engraving a bakelite name plate for a Barber-Colman control unit panel. The name plate is copied from a template (shown above) using a 5/16" diameter carboloy-tipped cutter. The tracer point is guided by hand around the outline of the template, which is clamped on the copy table.

In addition, the Pantograph Engraver may be used for engraving dies, molds, dials, flat and curved work, and other general engraving work. The machine may be operated by unskilled labor, and only a few minutes are required to explain the operation of the machine.

If you have work of this type in your plant, the installation of a Gorton Pantograph Engraver will not only improve the appearance of your product, but may also reduce the cost on all of your engraving work. Your request for additional information on Pantograph Machines will not obligate you, and will give you the information necessary for checking more carefully into its possibilities for your work.

FREE CATALOG—Send today for your FREE copy of Bulletin No. 1580-A, showing how Gorton 2 and 3 Dimensional Pantograph Machines are used to produce Stencils, Dies, Rolls, Steel Stamps, Relief Engraving and general flat work.

GEORGE GORTON MACHINE CO.

1319 RACINE STREET, RACINE, WISCONSIN, U.S.A.
SPECIALISTS IN ENGRAVING, DIE MAKING AND SUPER-SPEED VERTICAL MILLING

Greater Precision With Sheer Tool Stand

THE George Scherr Company has just brought out a new Scherr Tool Stand designed primarily to serve as a vise or clamp for holding micrometers, snap gages and other tools.

It is generally known that if micrometers and gages are held in the hand the heat transmitted to the frame will expand and distort them sufficiently to make accurate reliable measurements impossible. A difference in temperature of only 10° to 15° will expand a 2" micrometer approximately a half-thousandth, aside from distorting the measuring anvils out of parallelism.

For serious measurements, therefore, and for setting micrometers and gages, the tools should not be held in the hand but placed in a vise, isolating them from body heat.

The Tool Stand has been developed for this purpose and is so constructed that the micrometer or snap gage may be held securely without damage to the finish of the frame. The jaws are parallel, without serrations. A small piece of scotch tape on the inside will hold the tool firmly without exerting too much pressure. The jaws may be swiveled from vertical position to horizontal. The base is cast iron, the jaws made of cold rolled steel.

In the inspection department where micrometers or snap gages are used for diameter or thickness checking the use of a Scherr Tool Stand will increase production a considerable extent.

The girl inspector on the left is using a gage without stand. She holds the gage in one hand, using the other to pick up the work. The girl on the right is using the Tool Stand, freeing both hands for checking the work, which results in a remarkable speed-up in gaging, increases skill and reduces fatigue, which develops more rapidly in the one-handed method.

Complete information regarding the Scherr Tool Stand may be obtained from George Scherr Co., 128-B Lafayette St., New York, N. Y.

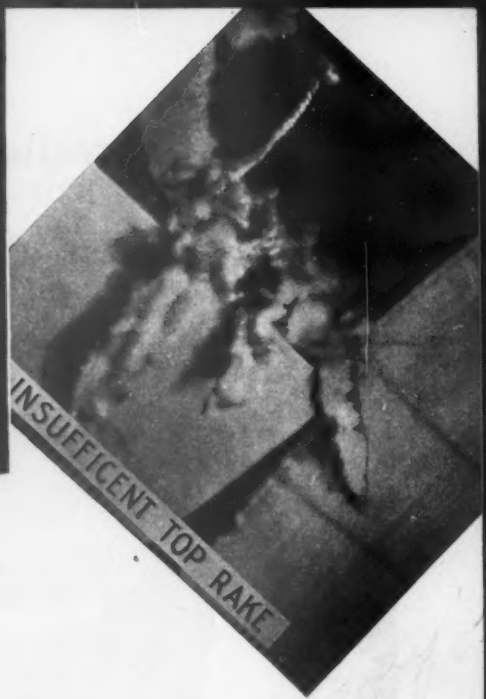
A Good Workman's K

His Chi

MACHINE tool operators are part of an army—an army of production. For this army to win every man must be depended upon to carry out his responsibilities well. By finding the proper methods of turning out the work, by improving on setups, by obtaining from each machine tool—all that is built into it, the men running American machine tools are turning in a record to be proud of.

Cutters are one answer to the success of this armament program. The more effective cutters can be made to perform, the greater success operators have with tooling setups.

The Warner & Swasey Co. have produced a sound film entitled "Chips" which is being used for training purposes in conjunction with their in-plant instruction of turret lathe operators. The photographs shown on these pages, taken from this film, show at 1/100 of actual cutting speed capacity what happens when a cutter is ground



...an's Known By His Chips

correctly and what happens when it is ground incorrectly.

The chip itself coming from a cut tells the skilled machinist when the cutters are working properly. To skilled operators, good chips are a mark of quality. When the chips are right, experienced workmen know the machining is right.

The importance of this instruction program being carried out by The Warner & Swasey Co. should not be minimized. To secure the maximum output that has been built into a machine the cutting tool must perform at top efficiency.

In a forthcoming issue we will publish an article on the Grinding and Setting of Cutters for the benefit of those who have been unable to participate in any organized instruction program. If you believe this article would prove valuable to you or your company will you write us to that effect?

Introducing the New

Welch

QUICK DEMAGNETIZER

A
REMARKABLE
TIME SAVER

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220 VOLT A. C.
60 CYCLE

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INSIDE
MEASUREMENTS
APPROXIMATELY
4″x11″

AN outstanding unit needed wherever magnetic chucks are used. Operates on 220 voltage. Any ordinary sized pieces, such as cutters, gears, washers, etc., can be demagnetized by a single pass through its powerful field. Can be easily connected by your own electrician in any convenient location in your plant. Equipped with convenient switch. (If your power is other than 220 volt, 60 cycle, A. C., kindly let us know.) Carried in stock for immediate delivery. 10 DAYS FREE TRIAL IF DESIRED.

Price $120.00

Write for particulars

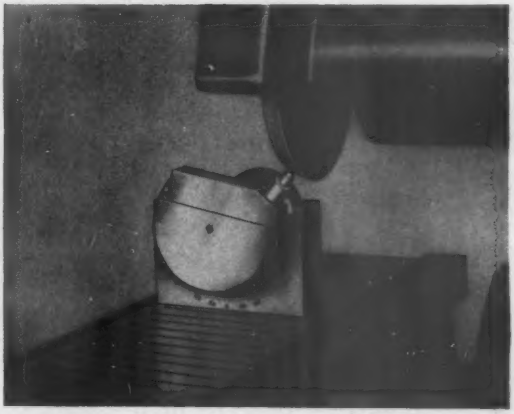
Welch INDUSTRIES, INCORPORATED

Makers of High Speed Milling Cutters — Form Tools and Special Tools

20000 WEST EIGHT MILE RD. DETROIT, MICHIGAN

Welch

QUICK ANGLE DRESSER



AS suggested by its name, the Welch Quick Angle Dresser can be set quickly for dressing the grinding wheel to any desired angle. It is small, compact, durable; simple in design and construction. All surfaces are hardened and ground. Furnished in plain or Vernier type. Plain dresser graduated in degrees .... Vernier reads in degrees and minutes. The Vernier being an integral part of the base block eliminates any possibility of error. 10 DAYS FREE TRIAL IF DESIRED.

ITS ADVANCED FEATURES APPEAL TO ENGINEERS and OPERATORS

Plain Type $70 Net
Vernier Type $82.50 Net

One Diamond is Furnished with Each Dresser

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Welch INDUSTRIES, INCORPORATED

Makers of High Speed Milling Cutters — Form Tools and Special Tools

20000 WEST EIGHT MILE RD. DETROIT, MICHIGAN

Variable pitch Propeller Blades made on the DoAll with great savings of time

Special Parts made on the DoAll in a fraction of former time

Sector Gears cut in 5 minutes each. Formerly took 30 minutes each on a miller

Disc Rims polished on the DoAll in 2 minutes each. Formerly took 1 hour each by hand.

DoAll

● No, we don't need any more time. We have as much time as our enemies, but we do need **more production per hour**, and that's where the DoAll Contour Machine is doing such a magnificent job—knocking former shape cutting records into a cocked hat!

ON THE JOB 24 HOURS A DAY

In every modern plant from coast to coast, wherever war orders are coming through on direct or sub contract, you find the DoAll doing all kinds of special production cutting, relieving $5,000 to $50,000 machine tools for other work.

★ ★ ★

Don't care what the metal or alloy is—there's a DoAll band to do the job not only quicker, but smoother and better.

FASTEST PRECISION METHOD TO REMOVE METAL

For external and internal sawing of all metals and alloys, (flats, blocks, bars, sheets or tubing) —for making special tools and parts without dies—for regular production work—investigate the DoAll, wonder machine of our day. There are 5 models with throat capacities ranging from 16" to 60", priced from $1000 to $5000, including motors.

PRODUCTION

TURNS MAN HOURS INTO MINUTES

Armor Plate ½" thick cut on the DoAll. Famer method was torch and grinding off flash.

THE DoALL USES 3 KINDS OF BANDS

SAW BLADES — FILE BANDS — POLISHING BANDS

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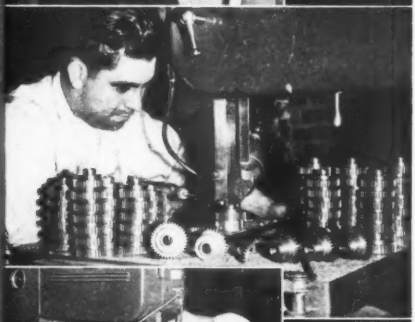

Sector Gears cut in 5 minutes each. Formerly took 30 minutes each on a miller.

Disc Rims polished on the DoAll in 2 minutes each. Formerly took 1 hour each by hand.

NEW—Send for helpful book "DoAll on Production" for a bird's-eye view of real accomplishment

DoAll

• No, we don't need any more time. We have as much time as our enemies, but we do need **more production per hour,** and that's where the DoAll Contour Machine is doing such a magnificent job—knocking former shape cutting records into a cocked hat!

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Under $5000 Under $2000 Under $1500

All Models with Motors

THE DoALL CO. DES PLAINES, ILL.

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TURNS MAN HOURS INTO MINUTES

Armor Plate 1⅛" thick cut on the DoAll. Former method was torch and grinding off flash.

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PEP UP PRODUCTION
AND YOU STEP UP VICTORY

Start using Graphitic Steel now—and increase your war production. Continue using it after Victory—and fortify yourself against post-war competitive conditions.

Mr. E. P. Kupprecht, Superintendent of The Chicago-Wilcox Manufacturing Company, Chicago, Ill., reports "We used to have considerable trouble with warpage in the thin sections of our intricate gasket dies. Graph-Mo steel has solved that problem and made our work a lot easier in other ways, too. Graph-Mo machines much easier than other die steels we've used and wears longer."

This is just one of the hundreds of testimonials pouring in from users of this remarkable new die steel.

Ask for your copy of the Graphitic Defense Handbook. It will answer all your questions about this steel.

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Manufacturers of Timken Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; Timken Alloy Steels and Carbon and Alloy Seamless Tubing; and Timken Rock Bits.

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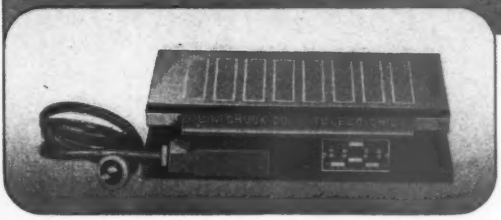
L-W CHUCKS, DEMAGNETIZERS and RECTIFIERS



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Guaranteed waterproof for wet or dry grinding. Operate on either 110 or 220 volt Direct Current.

10¾" wide x 37" long..... $202.05
8" wide x 24" long 109.30
6½" wide x 18" long 63.15
5¾" wide x 13" long 47.65

L-W Rectifiers

For converting A.C. into D. C. for use on magnetic chucks. Two tubes provide ample reserve tube capacity. For use on our 5¾" x 13" and 6½" x 18" Magnetic Chucks. A. C. Input Volts..110. D.C. Output Volts....110. D.C. Amp. Output...8 Amp. $25.00

L-W Demagnetizers

For removing magnetism from work that has become magnetized through induction. Simple pass over stationary poles completely demagnetizes work.

7¾"x12½"x6¾" $63.20
7¼"x 7¼"x6¾" 41.15

Send for New Catalog.

L-W CHUCK COMPANY
TOLEDO · OHIO

A Billion Every Month!

ELEVEN thousand, five hundred seventy-four hungry, exhausted but brave defenders of Bataan are now Japanese prisoners. The lack of effective fighting equipment, of guns, of ammunition, of airplanes, finally defeated them. At the end it was discovered that they had been short of food and water for weeks.

In the Philippines, as at Pearl Harbor, Wake Island and Guam, time and distance worked against us. Such calamities are happening to our fighting forces while we here at home, by comparison, live in safety and comfort. Even with rationing we shall continue to maintain higher standards of living than any other nation in the world.

A lot of money is required to conduct a war nowadays and more will be needed. There must be no more surrenders because of lack of equipment. As a guarantee that this will not happen, the American nation must pledge itself to buy not less than $1,000,000,000.00 worth of War Savings Bonds every month. The Payroll Savings Plan will assure this if the workers in plants and businesses everywhere will adopt this plan.

The Payroll Savings Plan now in operation in many American plants provides for the systematic deduction each month of an amount voluntarily stipulated by each employee. The employer buys a bond and delivers it to the employee each time the accumulated amount is sufficient.

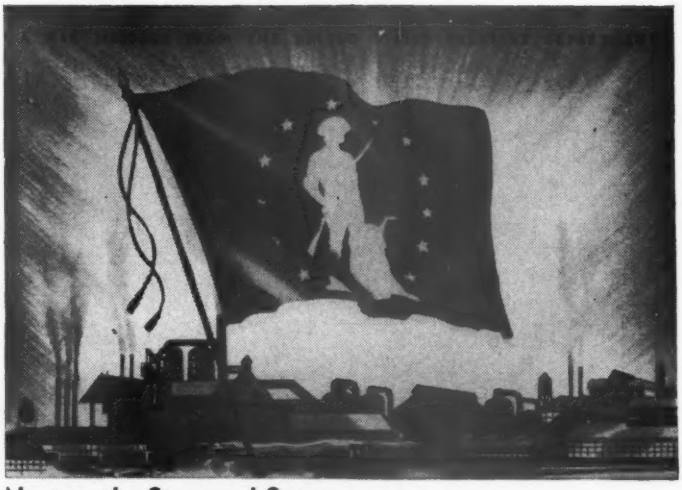
United States War Savings Bonds are today the world's safest investment. Their purchase assures:

1. A safe, profitable investment—interest at 2.9% per annum.
2. A surplus in hand during the period of readjustment after the war.
3. Conversion of surplus funds into a savings account reduces the commodity buying pressure which can make so much trouble in the form of inflation.

The United States Treasury estimates that there will be, by the end of 1943, a total of $15,000,000,000.00 of accumulated earnings for which there will be no commodities available for purchase. It will be readily seen that if that sum is invested in War Savings Bonds it can save us from a big financial headache.

The staff of The TOOL & DIE Journal is going all-out for the Payroll Savings Plan. So should every other business organization and particularly the war production plants. Plant managements often are reluctant to propose the Payroll Savings Plan because after all it is the worker's voluntary act which initiates the withholding of a part of his earnings. Therefore, as *you* read this, resolve to originate the request for the Payroll Savings Plan in your plant or join in expressing your opinion in favor of it and thus let your favorable sentiment carry to the management.

Just remember! All you are doing is loaning your money to your Government. Sons, brothers, husbands and friends are GIVING, in many instances, all they have.



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AS PROUD A FLAG AS INDUSTRY CAN FLY

Signifying 90 percent or More Employee Participation in the Pay-Roll Savings Plan

IT doesn't go into the smoke of battle, but wherever you see this flag you know that it spells Victory for our boys on the fighting fronts. To everyone, it means that the firm which flies it has attained 90 percent or more employee participation in the Pay-Roll Savings Plan . . . that their employees are turning a part of their earnings into U. S. Savings Bonds *regularly,* every pay day, with the goal being 10 percent of the gross pay roll allotted to Bonds. You don't need to be engaged in war production activity to fly this flag. Any patriotic firm can qualify. For facts about the Pay-Roll Savings Plan, write Treasury Department, Section D, 709 12th Street, NW., Washington, D. C.

MAKE EVERY PAY DAY "BOND DAY"

U. S. **WAR Bonds ★ Stamps**

This Space is a Contribution to Victory by The TOOL & DIE Journal Staff

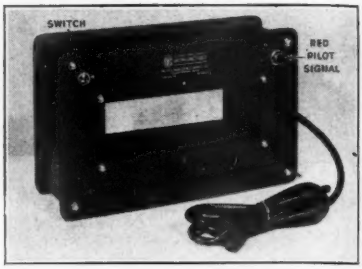
AMC Demagnetizer

A Tool Room Necessity

Every tool room needs this simple, portable, sturdy demagnetizer. Small parts passed through the powerful AMC field are instantly demagnetized. Large, flat surfaces can be demagnetized by sliding the device over the surface.

Price is only $32.50, complete as shown.

Write for full information.



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BY means of expanded apprentice courses and special training classes, more than 4,000 production recruits are being taught trades vital to the manufacture of war materials at the major plants of the Westinghouse Electric and Manufacturing Co. Within the last 12 months some 1,500 men have been graduated and now are using their newly-acquired abilities to help fight the battle of production.

TWO modifications in the use of preference ratings under the Production Requirements Plan were announced in April by A. L. Williams, Chief of the Production Requirements Branch.

In cases where a rating assigned under PRB is subsequently raised to a higher rating after appeal to the Production Requirements Branch, the applicant may notify his suppliers of the higher rating by letter instead of making out completely new purchase orders.

The other change permits a producer to make out a single order covering his requirements for the same material or product, even though he uses two or more different preference ratings which have been assigned to him.

BY approving a small increase in the maximum price for a machine tool used to make airplane engine piston rings, Price Administrator Henderson cleared the way for production by subcontractors of 150 additional urgently needed units.

OFFICIAL texts of over 600 OPA and WPB price schedules, limitation orders, allocation rulings, preference ratings, amendments and interpretations have just been made available without charge by the New York Journal of Commerce at 63 Park Row, New York, N. Y.

Saw-way MULTI-PURPOSE INTERNAL GRINDER

Headstock moved back and at angle position for grinding tapered hole.

Looking down on top of machine from grinding spindle end.

Offers greater flexibility . . . a precision grinder, designed and built by engineers with years of practical experience to guide them . . . has a headstock traverse of 6″ . . . grinds holes ¼″ to 18″ in diameter . . . holes up to 9″ deep, straight or tapered . . . entire headstock may be moved at right angle to wheel traverse, by merely loosening two conveniently located nuts . . . worm compensating device permits grinding wheel head adjustment to .0001 . . . sturdy construction throughout . . . full specifications, delivery time and price on request.

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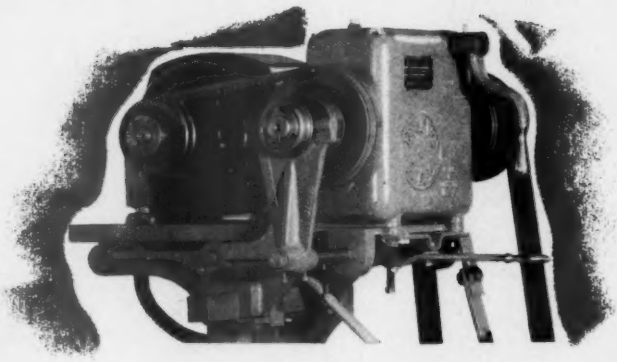
A New Faster Drive for Your Veteran Machine Tools will Win the Production Victory



If you have some veteran machine tools that don't give you the kind of production these days call for, the case is far from hopeless. You can get higher speeds and heavier feeds simply by installing new Drive-All motorizing units. Standard Unit 1 to 5 h.p., Heavy Duty Unit 5 to 10 h.p. Both units available with 3-speed or 4-speed gear box. A couple hours is sufficient time for average installation. Prompt shipment to plants on war production work. Mail the coupon at the right.

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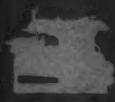

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Accuracy and Speed are definite "musts" for successful and total war production.

The well-known **BECKER INDEX MASTER** manufactured by The Bunell Machine and Tool Company is used exclusively by many manufacturers of aircraft, ordnance, and navy parts—to accurately and speedily determine their conformance with drawing specifications. When you compare the present methods used in inspection and layout of tools and parts where a bevel protractor or sine bar must be set for each dimension—you can readily see the great advantage of using the **BECKER INDEX MASTER** which saves precious time.

WRITE FOR A DESCRIPTIVE CIRCULAR

About May 15 we will be in our new plant at 1601 East 23rd Street

THE BUNELL MACHINE & TOOL COMPANY

1620 EAST 24th STREET · · CLEVELAND, OHIO

City_____ State_____

The Place for Idle Machines

A NUMBER of foreign correspondents have said that World War II is "hell on wheels". America's principal job thus far has been to supply the wheels. Daily we hear reports that production of tanks, guns, airplanes, warships and other necessary equipment of mechanized warfare are rolling off the production lines in greater and greater quantities. Many production figures are balancing unbelievable schedules prepared six months or a year ago.

Since the very beginning of our National Defense Program the machine tool industry has been a serious bottleneck. In a normal production year, this industry annually produced approximately $60,000,000 worth of new machines. Last month alone machine tools were produced to the value of $97,000,000. Government officials have said that it will be necessary to produce 66,000 machine tools valued at $2,000,000,000 in 1942. This is a goal that will be extremely difficult to reach. However, this demand unquestionably shows that a large number of machine tools are still required for our War Program, some of them so critically needed that some production is being materially hampered.

On the other hand, there are frequent reports that manufacturers with war contracts are purchasing new machines and storing their old equipment which cannot be utilized in their new production schedule. One automobile manufacturer now building aircraft engines is said to be using only 819 of their 1400 machine tools. The majority of these rumors have been traced down and it is found that the stored machines were not of the types then needed for war production.

A current survey of used machinery dealers shows that there is a constant demand from sub and prime contractors for every idle machine tool. One firm that did not feel justified in selling their idle machines to war contractors found each of their machines labelled as follows: "This machine is working for Hitler." The question is, do you have any "Hitler Helpers" in your firm or department? Used machinery dealers will cooperate with you by advising whether these machines can be used to a sure and American Victory.

Sharp Tools Wear Longer... Do a Better Job

SAVE YOURS with

QUEEN CITY GRINDERS

BALL BEARING BENCH, PEDESTAL and DISC TYPES

Tool grinding is only one of the many jobs handled efficiently by Queen City Grinders.

They are built in a complete range of sizes in bench, pedestal and heavy duty box type bases in units from 1 H.P. to 10 H.P.

These grinders are powerful—sturdy units equipped with two Carborundum wheels, one coarse, one fine—safe enclosed wheel guards with built in exhaust—Allen Bradley push button switch with overload protection—adjustable and safe work rests—tool tray—water pot—adjustable, shatter proof, clear glass eyeshields.

All Queen City Grinders come fully equipped with grinding wheels, ready for immediate use.

The initial cost is also comparatively lower than most grinders.

QUEEN CITY DEALERS at your Immediate Service

Geo. M. Bernstein & Co.	Chicago, Ill.
Indianapolis Machinery & Supply Co.	Indianapolis, Ind.
James W. George Machinery Co.	Detroit, Mich.
Eichman Machinery Co.	Kansas City, Mo.
McDonald Machinery Co.	St. Louis, Mo.
Cincinnati Machinery & Supply Co.	Cincinnati, O.
Hess-Schenck Co.	Cleveland, O.
E. W. Smith Machinery Co.	Columbus, O.
C. H. Geiger Machinery Co.	Dayton, O.
Elyria Belting & Machinery Co.	Elyria, O.
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QUEEN CITY MACHINE TOOL CO.

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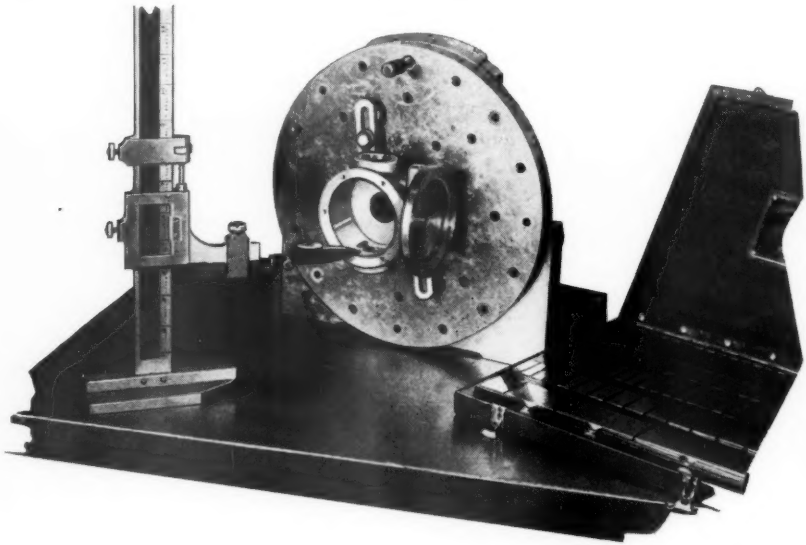

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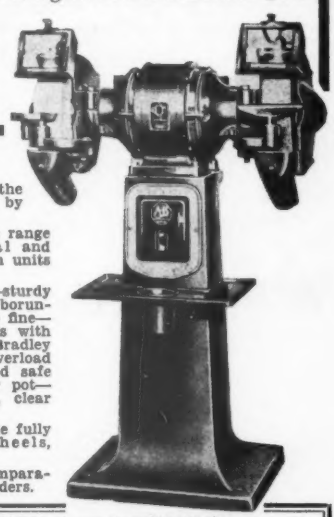

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No. 5 Niles-Bement-Pond Bulldozer.

No. 24 Williams & White Bulldozer.

No. 4 Canton Gooseneck Crane, 2½ ton capacity, double back-geared.

Grob Band Saw, open end, 19" throat, 5½" capacity, table 24 x 28.

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TOOL DESIGNERS
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needed for War Production work.

Please give experience (do not apply if you're now employed on War Work.

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Broach, No. 2, LaPointe, M.D.
Die Filer, Rearwin, tbl. 18"x17", stroke 8"
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Drill, Radial 2' Mueller, T.A., M.D.
Gear Cutters, Spur 30"x16", 36"x9" & 40"x12" G & E
Gear Planers, 36" & 54" Gleason Bevel, M.D.
Grinder, Cylindrical Wells 6"x14", M.D.
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Grinder, Univ. No. 5 B & S, tbl. 20"x72", B.D.
Grinder, Worm-Hob Pfauter "FS", B.D.
Keyseaters, No. 2 & No. 3½ Baker
Lathe, 16"x6' Emmes, P.C.G., S.B.G., B.D.
Lathe, 27"x11' LeBlond Grd. Head, M.D.
Miller, Vert. No. 2 Becker, tbl. 30"x3⅞", M.D.
Press, End Wheel No. 3 Bliss, Roll Feed, M.D.
Press, Hydraulic 1000-ton Woods, platen 42"x9'
Press, O.B.I. No. 3 Toledo, stroke 1¼"
Shaper, 20" Hamilton High Duty, M.D.
Slotters, 8" Betts & 15" Dill, M.D.

LANG MACHINERY COMPANY, 28th St. & A. V. R. R., PITTSBURGH, PA.

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Grinding equipment for all but radius work. Prefer sub-contracting with Contract Tool & Die Shops.

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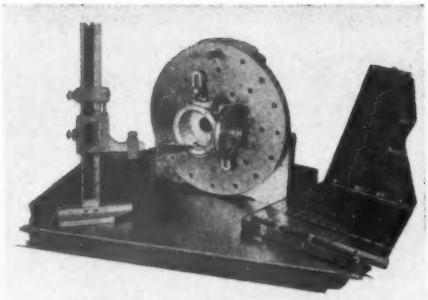
7500 STANTON AVENUE CLEVELAND, OHIO

Becker Index Master for Layout and Inspection



A SIMPLE, accurate method of laying out and checking work has long been needed in shops where precision and speed are equally important.

The Becker Index Master is an index, layout and inspection fixture that combines both accuracy and speed in making layouts and checking measurements. This fixture consists of an angle plate and a vertical index plate which revolves in an accurately fitted center bearing. Each side of the angle plate is cut away, forming steps where hardened, ground and lapped anvils are located. This makes the method of checking angles reversible—a positive proof of its accuracy.

These anvils are parallel to both the center bushing and the base of the angle plate.

The vertical index plate, which can be clamped in any position, revolves on the bearing stud fitted in the center bearing of the angle plate. The outside rim of the index plate is graduated by degrees over the entire circumference. Eight index holes, with hardened, ground and lapped bushings, are located 45 degrees apart. These index holes have exact center distance, not only from the center bushing, but also from each other.

Illustrated literature is available. Address The Bunell Machine & Tool Co., 1620 E. 24 St., Cleveland, O.

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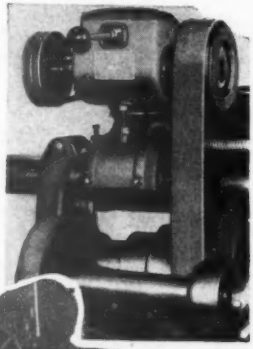
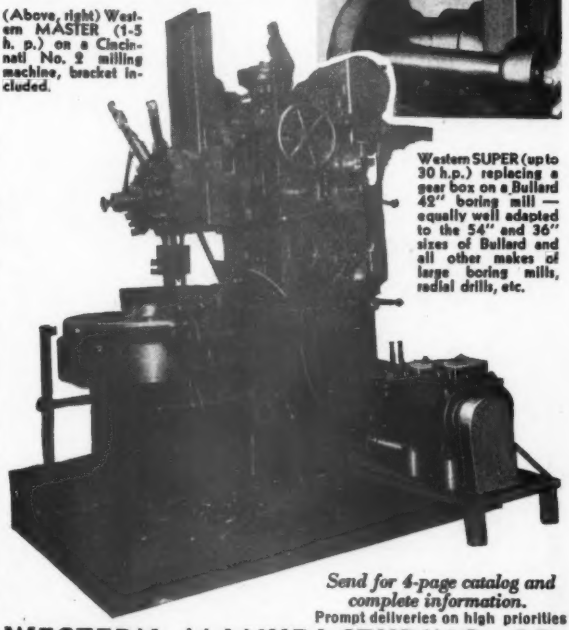
A MASTER (capacity 1-5 h. p.), a MAJOR (capacity 5-10 h. p.) and a SUPER (up to 30 h.p.) can be installed on lathes, milling machines, shapers, radials, slotters, boring mills, gear cutters, die sinkers, etc.



(Above, right) Western MASTER (1-5 h. p.) on a Cincinnati No. 2 milling machine, bracket included.



Western SUPER (up to 30 h.p.) replacing a gear box on a Bullard 42" boring mill — equally well adapted to the 54" and 36" sizes of Bullard and all other makes of large boring mills, radial drills, etc.

Send for 4-page catalog and complete information.

Prompt deliveries on high priorities

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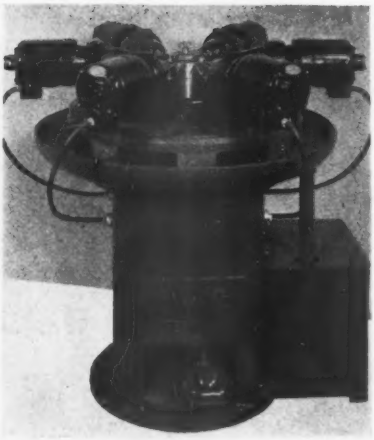

Govro-Nelson Units Protect Small Drills

THE Govro-Nelson Units were designed primarily for the protection of small drills, particularly where they break through at an angle to the surface or into corners and ribs.

The Units, being completely self-contained, can be mounted in any angle or plane and operated by one or more circuits controlled by the operator or by other moving parts of a machine in which they may be incorporated.

The principle of centrifugal force is employed for feed pressure. The rate of feed of the drill depends on the number and mass of the weights. Two or more weights of light or heavy construction within the range of the mechanism can be installed to provide the maximum pressure that can be used by the small drills. This permits faster drilling than is possible with power feed mechanisms which must be set to protect a partially dull drill. Overly dull drills or hard spots in the material does not break the drill as with positive feed devices.

For quick resetting of the feed mechanism, to provide rapid cycling, electrically controlled brakes are built into the units. Hollow shafts are also available for the installation of plungers which can operate switches as the drill spindles return to the starting position. These switches can operate interlocking or indexing mechanisms as desired.

Engineering advice is available. Address Hole Engineering Service, 5901 Fourth Ave., Detroit, Mich.

LINCO *Two Spindle*
ADJUSTABLE
DRILL HEADS
DRILLS TWO HOLES AT ONCE

✓ *Adjustable Centers from ½" to 6"*
✓ *Drill Capacity 0" to ⅝"*

Sleeve and overarm types . . . in several sizes. Will double output of any single spindle drill press.

Quickly adjusted to desired drill centers from ½" to 6".

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12250 COYLE AVE., DETROIT, MICH.

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DESIGNED for resistance welding of heavy sections of special alloy steels such as homogeneous and face-hardened armorplate, and for shipbuilding, the new Progressive "Temp-A-Trol" forge welder both spot welds and heat treats the weld. Close control of weld nugget size, ductility and grain refinement are thus obtained. It is said that the welder also avoids annealing of hardened surfaces in plate.

With completely automatic control of weld, heat treat and annealing cycles, the new Temp-A-Trol reduces the human element in selecting weld and heat treat cycles to a mere setting of the dials to the actual temperatures desired.

This machine provides automatic compensation for current loss due to varying amounts of work introduced in the throat of the welder—something almost impossible to compensate for accurately by means of manual controls.

Again, the Temp-A-Trol control also compensates for current loss through adjacent completed welds. Obviously, when a spot weld is made close to another completed weld, part of the welding current will short circuit through it, causing a variation in the actual amount of current used. With Temp-A-Trol welding, this loss is meaningless since the amount of current is automatically increased to compensate for the loss.

Detailed information on the new process will be furnished. Address Progressive Welder Co., East Outer Drive, Detroit, Mich.

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The Ultra-Lap machine will finish your parts to a flatness of one light band or less . . . to a smoothness as low as one micro-inch R.M.S., any metal or material. Much faster, more uniform than hand method. Machine designed for you or we shall be pleased to lap your parts on a job basis. Ultra-Lap machines and service used by aircraft and many other war-time industries.
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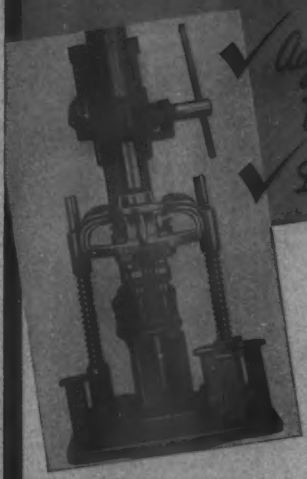

✓ *Adjustable Centers from ½" to 6"*
✓ *Drill Capacity 0 to ⅝"*

Sleeve and overarm types . . . in several sizes. Will double output of any single spindle drill press.

Quickly adjusted to desired drill centers from ½" to 6".

Send for bulletin.

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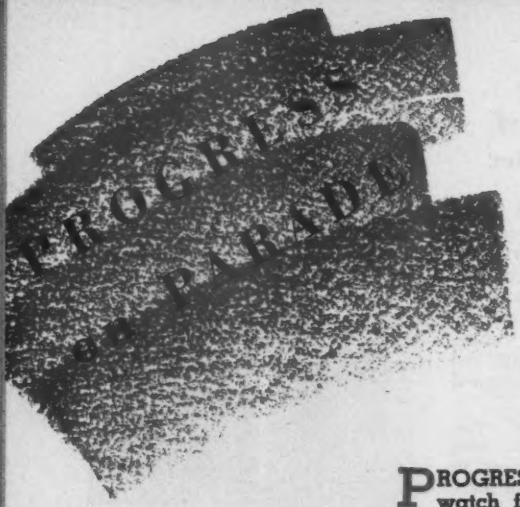
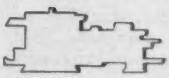
This machine provides automatic compensation for current loss due to varying amounts of work introduced in the throat of the welder—something almost impossible to compensate for accurately by means of manual controls.

Again, the Temp-A-Trol control also compensates for current loss through adjacent completed welds. Obviously, when a spot weld is made close to another completed weld, part of the welding current will short circuit through it, causing a variation in the actual amount of current used. With Temp-A-Trol welding, this loss is meaningless since the amount of current is automatically increased to compensate for the loss.

Detailed information on the new process will be furnished. Address Progressive Welder Co., East Outer Drive, Detroit, Mich.

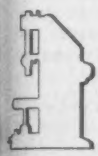
FLATNESS and SMOOTHNESS
of Production Parts
The Ultra-Lap machine will finish your parts to a flatness of one light band or less . . . to a smoothness as low as one micro-inch R.M.S., any metal or material. Much faster, more uniform than hand method. Machine designed for you or we shall be pleased to lap your parts on a job basis. Ultra-Lap machines and service used by aircraft and many other war-time industries.
Ultra-Lap MACHINE COMPANY
245 McDOUGALL AVE. · DETROIT, MICH.

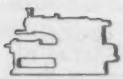




PROGRESS on Parade is constantly on the watch for any conspicuous service rendered to our War Production Program. The Simmons Machine Tool Corp. in their huge Albany, N. Y. plant is doing a conspicuous service in rebuilding and modernizing rundown, obsolete and defective machines of every type, make and size. This "Mechanical Mayo Clinic" makes an exhaustive analysis of each machine and then it is thoroughly cleaned and dismantled. New parts in the rebuilding process replace bushings, gears and other worn parts. The beds are lined up and the way ground to a perfect bearing.

Obsolete machine tools belonging to the venerable vintage of countershaft driven machines are converted into individual variable speed motor driven machines. Of equal importance to the motorizing of machine tools is the frequent problem of increasing the capacity of such machines as lathes, boring mills, planers and planer-type milling machines. Beds or tables are lengthened, housings widened, rails and heads raised.





The illustrations show the largest surface grinder in existence, which was developed to correct quickly and efficiently warping in tools with long tables. The conversion was made from a planer type miller into a worm driven grinder with a swivel mounted head for grinding angles as easily as flat surfaces, together with heads for milling and planing parts on the same machine not requiring grinding. It has a capacity of 72″ x 42′ and cuts within a tolerance of .002.

The Camden Forge Co. had urgent need of a 36′ boring mill for machining the forged steel turrets for the big guns on battleships. These swiveling turrets are as large as 36′ in diameter. Simmons produced this giant mill, unique in design—requiring a main drive gear 24′ in diameter—in 13 weeks. Since it was delivered in 1937, this boring mill has been working 24 hours daily turning out turret rings for America's two-ocean Navy.

Device Calculates Milling Speeds

ONE of the ever-present problems confronting machine tool operators, setup men and production supervisors is to run the machines at their highest speeds consistent with the greatest number of pieces per sharpening of the cutters.

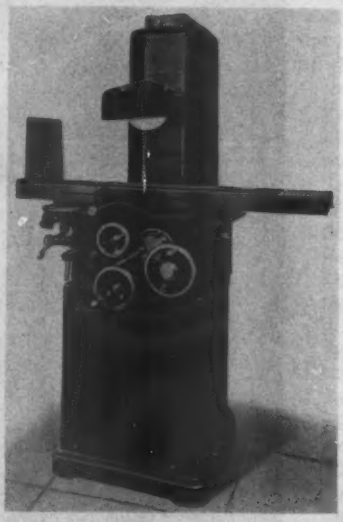
Men having little shop experience are inclined to run their machines at either one of the two extremes: overcautiously slow or so fast that the cutters burn. Both conditions are a serious drag on production.

In order to make it possible for the operator of a Cincinnati Dial Type Milling Machine to select the correct spindle rpm for any combination of work and tool materials and cutter diameter, the machines are now equipped with the built-in milling speed calculator. It is, in effect, a circular slide rule especially designed to solve this particular type of problem.

On the periphery of the stationary disc are scaled various cutting speeds from 20 to 4000 fpm. On the top of the larger movable disc, cutter diameters are given, while at the bottom cutter rpm appear.

The illustration shows the setting as made by an operator who had a setup of SAE X-1112 steel with a three inch diameter high speed steel cutter. He set the small disc so that "high speed" showed in the lower window, and the larger disc so that the arrow in the upper window pointed to "3"—the cutter diameter.

(Continued on Page 75)



#2 AUTOMATIC PRECISION TYPE SURFACE GRINDER

capacity 6" x 12" x 18"

PROMPT DELIVERIES

ATLANTIC MACHINERY CORPORATION

149 Broadway, New York, N. Y.

Ellstrom Gage

Facilitates Adjustments

THIS internal setting gage (patents applied for), was designed by Elmer Ellstrom of the Dearborn Gage Company to eliminate the old-fashioned time wasting method of setting instruments and gages by using clamps and parallels with gage blocks. Its gaging surfaces are processed and finished to millionths in flatness, thereby making possible the ultimate in checking with the minimum of adjustment. For example: if the gage is adjusted for 2" reading and a 1.875" reading is desired, it isn't necessary to make a readjustment; all that is required is to wring a .125 gage block on the bottom surface of the gage, immediately giving a 1.875" check.

Another feature of the Ellstrom Gage is that it can be used either vertically or horizontally to facilitate adjustments.

The gage illustrated will cover readings up to 6".

Constructed of the finest steel, it is simply and quickly adjusted by two thumb screws on each riser.

Additional information will be sent on request. Write Dearborn Gage Co., 22034 Beech St., Detroit.

Milling Device

(Cont. from P. 74)

Following the arrow in the SAE X-1112 section of the smaller disc, he finds that the correct speed is in the range 95-130 fpm and that when using a 3" cutter the spindle must be set to operate at 142 rpm.

Cincinnati Milling Machine Co., Dept. E-3, Cincinnati, O., will send illustrated material.

NEW C-66 RADIUS DRESSER FOR SURFACE GRINDER

Photo taken in Operation

A low-priced, rugged attachment for any make of surface grinder. Mounts directly on magnetic chuck. Dresses Wheel without dismantling machine.

A ONE HOUR JOB IN TEN MINUTES

The C-66 will accurately dress wheels to both male and female radii. Operation is open and easy to see. For dressing wheels for grinding turning tools, the dresser is set at angle equal to clearance angle of tools. The C-66 is the only radius dresser with this feature.

Prompt delivery from factory

Price, without diamond, $72.50. ¼K Diamond $5.

SEND FOR NEW CATALOG

SCHULTZ & ANDERSON CO.

Machine Tools

111 Edison Place Newark, N. J.

Flatness and Finish Attained with Rotary Grinder

THE 6" Rotary Surface Grinder is designed to impart the highest possible degree of accuracy, flatness and finish to the plane surfaces of gages, tools and parts. This grinder employs an exclusive feature in the mounting of the wheel spindle, which swivels in a vertical plane about the center of the wheel. The spindle is carried in an accurately bored cast iron block mounted between two pairs of circular dovetail slides. Wheel clearance being rapidly provided, grinding to sharp corner or shoulder is greatly simplified.

The ball-bearing, quill-type wheel spindle is driven directly from a 1 hp motor at 3600 rpm. Motor control is provided through a toggle switch mounted on the right side of the pedestal below the saddle.

The work spindle is mounted on preloaded precision ball bearings and carried in a housing which gives suitable support and adjustment through its mounting on the machine saddle. The drive is through a worm and gear reduction from a ¼ hp motor mounted at the base of the spindle housing. The magnetic chuck is of special design, with a work surface 6" in diameter, permitting the holding of very small pieces of work at the center of the face plate.

The full ball bearing construction of this grinder minimizes friction, eliminates unnecessary effort on the part of the operator and reduces wear.

The Taft-Peirce Mfg. Co., Dept. T3, Woonsocket, R. I., will send full details.

The Jackson No. 2 Verticle Milling Machine, ruggedly built of quality materials, will prove indispensable for Tool Room or Production applications. 5 speed V-belt drive, sturdy 4¼" quill and ¾" spindle capacity 8" x 32" table.

JACKSON
MACHINE & TOOL COMPANY SALES DIVISION
956 Roberts St. Jackson, Michigan

Turret Tool Post Saves Operating Time

THE new Mastercraft four-way light weight indexing turret post has been redesigned for greater accuracy and faster action for use on 10" South Bend, Sheldon, Clausing, Atlas, Logan and similar bench lathes. The turret post is mounted directly on the compound cross slide of the engine lathe in place of the conventional tool post.

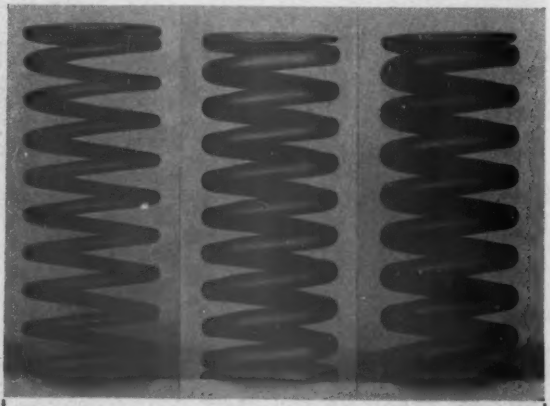
When a quantity of duplicate parts are to be produced, an appropriately shaped cutting tool is placed in each of the four tool slots of the turret block and held securely by means of two socket head set screws.

A half turn of the handle permits the tool block to be rotated to the next station, while a return of the handle to the right securely locks it for the next cut. Thus, a turning, threading, recessing and cutoff tool or any other required combination may be used in one setup.

Any number of tool blocks may be operated on the same turret post. Because of this interchangeability feature difficult or particularly accurate tool setups may be preserved by removing the tool block, with all tools intact, and holding in tool storage for future use.

The indexing elements in the Mastercraft turrets are self compensating for wear, insuring continued accuracy.

For descriptive literature address F & M Sales Co., 1050 Cahuenga Blvd., Hollywood, Cal.



Three Lines of Die Springs

We now stock three complete lines of Die Springs: Medium Pressure—50% Deflection; Medium-Heavy Pressure—37% Deflection; and High Pressure—30% Deflection.

Heat Treated Alloy and Common Screws—Cerromatrix Hardsteel Drills—and other Die Maker's Supplies and Accessories.

Ask for new Die Spring Bulletin

DIE SUPPLY COMPANY

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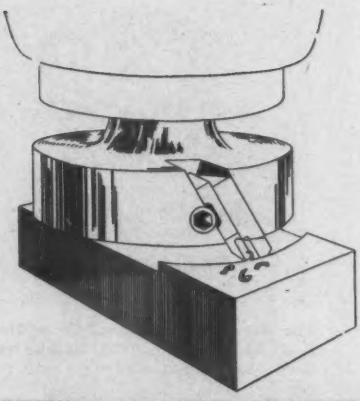
1390 East 30th St. Cleveland, O.



Single-Bladed Kennamill Announced

AT a time when manufacturers of standard milling cutters are unable to keep up with the demand, McKenna Metals Co. announces a method by which simple facing cutter heads may be made in almost any shop. Due to its high cutting speed, it is claimed, this single-bladed "Kennamill", employing Kennametal tools, will often work more efficiently than a standard cutter requiring many high speed steel blades.

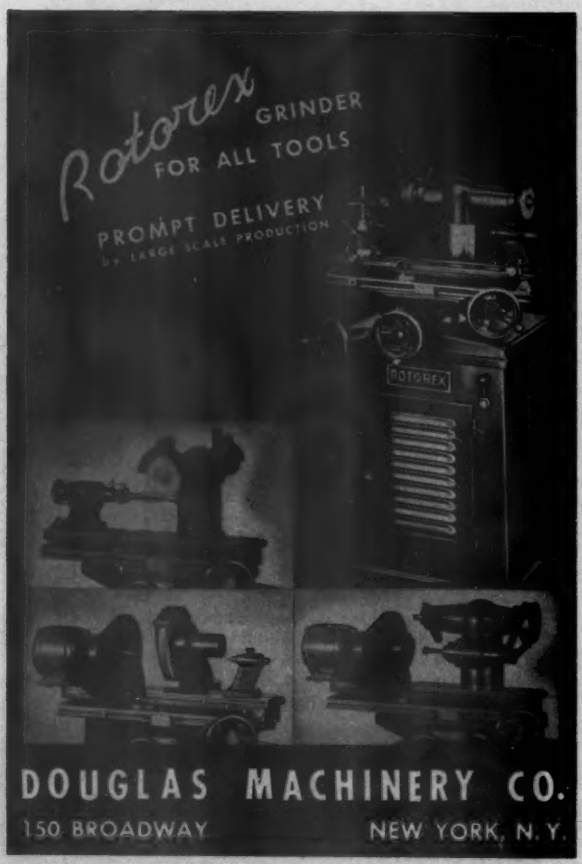
Designed with a large negative spiral angle of 35° to 55° and positive hook of 15° to 25°, this cutter mills steel efficiently only because Kennametal does not "gall" or permit the adherence of steel chips to the hard, strong tool tip.

For roughing, with cuts up to ⅝" deep, a 35° negative helical angle and 15° positive hook on a 12" diameter cutter head has been found to work efficiently. For light finishing cuts a negative helic of 55° with 20° positive hook angle is most efficient. The hook angle should be less on a smaller diameter head.

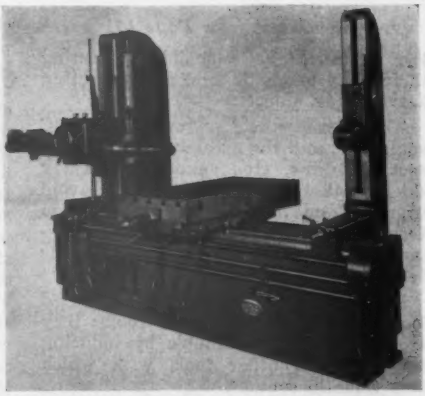
Kennametal cutters should be run to give 300 to 600 fpm peripheral speed, with a table feed of .008" per revolution, depending on the material being machined.

The Kennametal-tipped blades can be removed from the cutter heads and reground quickly, an important advantage over standard cutters.

McKenna Metals Co., 500 Lloyd Ave., Latrobe, Pa., will furnish additional information.



Easily Controlled Performance Offered



THE Yoder Horizontal Boring Mill is a tool about which operators become enthusiastic because its flexible, easily controlled performances need only be experienced to be appreciated.

The spindle is accurately ground to size and is mounted on preloaded precision type Timken bearings. A flange on the outer end permits bolting large milling cutters or other attachments to the spindle. A hardened and ground multiple thread worm on a vertical shaft drives a heavy worm gear mounted on the spindle. This method of driving the spindle eliminates all noise and chatter.

The head is made of high strength semi-steel, giving it greater rigidity and strength. A power driven rapid traverse is provided for the head. A simple arrangement automatically disconnects any feed which may be in when the rapid traverse is engaged.

The main drive is direct from a motor through a double multiple disc clutch which makes starting, stopping and reversing easy. A quick change gear box with back gears gives a total of sixteen speeds.

The outer support is a heavy open-side box section high strength semi-steel column, carefully fitted to the base. Vernier scales, which are matched with vernier scales on the head and column, make set-up easy.

Write to The Yoder Sales Co., Dept. T6, Cleveland, O., for descriptive literature.

Special Springs
GIBSON-SPRINGS
FOR DIES and TOOLS
Write
If you want a more dependable source of supply in these troubled times, or assistance on some problem involving springs—get in touch with us. 65 years specialized experience.
WILLIAM D. GIBSON COMPANY
1800 Clybourn Ave., Chicago, Ill.
DIVISION OF ASSOCIATED SPRING CORPORATION

(Continued from Page 45)

less as a magnetic shield, preventing their stray magnetic field from affecting surrounding objects.

The magnetic field surrounds some DC equipment and the secondary circuits of spot welders, etc., cannot be easily shielded, therefore the only way to avoid trouble from induced magnetism is to keep hardened tools a reasonable distance away from these local magnetic fields.

Permanent magnets or magnetized tools have no place in a tool room; they are liable to cause trouble by inducing magnetism in other tools with which they come in contact.

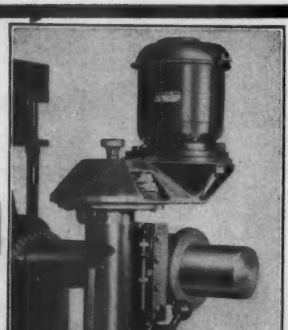
Most electro-magnetic chucks, that is, chucks operated from a direct current power supply, are furnished with a releasing switch by which the electric current producing the magnetism in the chuck may be turned off or reversed. A momentary reversal of the polarity of the current flowing in the chuck serves to cancel the residual magnetism in the face plate of the chuck so that the work being held can be readily removed. Many parts, particularly those of hardened steel, become permanently magnetized by the strong magnetic field to which they have been subjected. Such hardened steel work should be demagnetized to remove this residual magnetism. Where consistent results are wanted, all cutting tools should be free from magnetism or be in a demagnetized condition.

HALCO

Universal Head

Speed Accuracy Dependability

FOR HIGH SPEED MILLING DRILLING BORING AND COUNTER BORING ON ANY ANGLE



Motor of heavy duty type, ½ H.P., 110 volts, 60 cycle, with plug-in cord and switch. Easily reversible for L. H. cutters. Five speeds 550 to 2900 R. P. M. Also 10 speeds 125 to 2900 R.P.M. available at extra cost.

PROMPT DELIVERIES

Over 500 Now in Use

THE Halco Hi-Speed Universal Milling attachment is designed to meet the demand for greater efficiency, better workmanship, and for speed in building tools, dies, jigs, fixtures, wood and metal patterns, and other machine products where accurate and fast machining is of prime importance.

With its 4 inch vertical travel, many drilling, milling, boring and facing operations can be accomplished in one setup. The total weight is approximately 90 pounds, and it can be easily mounted by one man.

Write for folder giving details or order now for quick delivery.

HALCO PRODUCTS CO.

14231 Birwood - Detroit, Mich.

Since the nearly universal use of alternating current as the dependable power source to most shops, demagnetizing equipment has become more simple and has grown in scope and efficiency to meet the growing need.

Demagnetizing Equipment

There are two general types of demagnetizing equipment available. First, the *Surface Type Demagnetizer*. These demagnetizers operate on alternating current frequencies from 25 to 60 cycles and normally at the regular commercial power voltages of 110-220 or 440 volts. These are available in the box type that mounts on a bench or a portable style with handles. This portable surface type demagnetizer is handy for demagnetizing pieces of work that cannot be readily moved. It may be used turned face up on the work bench or by grasping the handles and pulling across the

"work". One pass of the work across the demagnetizing surface (at right angles to the insulating strips) is all that is necessary. These demagnetizers are powerful and sometimes on small parts and gages a thin board or cardboard may be interposed between the parts and the demagnetizing surface. This facilitates handling and removal from the strong alternating field.

Although these demagnetizers are rated for intermittent service, they are constructed so they will not burn out even if accidentally left turned on.

A special variation of the Surface Type Demagnetizer is one that is oil-cooled and with adjustable pole pieces. It is used for the production demagnetization of the new magnetic alloys such as cobalt and alnico, in conjunction with special fixtures for demagnetizing large rings or bearing races.

Second, *Through Type Demagnetizers.* These demagnetizers also operate on alternating current of commercial frequencies and voltages and are available in sizes from openings of a few inches to as large as three feet across.

The work to be demagnetized is dropped or passed through these demagnetizing coils, hence the name, Through Type Demagnetizer. To operate, alternating current power is turned on, the work is passed through the demagnetizing coil and removed a distance of one to two times the maximum coil dimension, when the power may be turned off. For shops where heavy sections of hardened steel become magnetized, there are available extra heavy duty demagnetizers designed especially for this work. They are highly efficient and are designed to give a concentrated demagnetizing field through which the work is passed. The thicker the work, the more difficult it is to demagnetize completely and therefore these Heavy Duty Demagnetizers require considerable energy and are only available for operation on the 220-v or 440-v power circuits.

The approximate current drawn on the medium size 220-volt Heavy Duty Demagnetizer is 50 amperes and the equivalent at 440-volt is 25 amperes. The current may, at first, look high but is necessary if a real demagnetizing job is to be accomplished. The inherent characteristics of all demagnetizers are that they

Already figured and charted for you in this catalog are the maximum hydraulic cylinder stroke lengths that can be used with the standard diameter piston rods. If this stroke length does not accommodate the job to be done, an alternate choice piston rod diameter is given with the maximum stroke that can be used for that diameter piston rod.

Along with information of equal importance to the user of hydraulic cylinders, this chart is shown in our catalog H-40. Your copy will be sent promptly on receipt of your request.

THE TOMKINS-JOHNSON CO.

630 North Mechanic Street — Jackson, Michigan

operate at a low power factor, therefore the actual power consumed is considerably less than would first be indicated by their current rating. Heavy Duty Demagnetizers should "fit the job" and not be specified larger than necessary; this is urged because for a given power input, the efficiency of the through type demagnetizer drops off with an increase in the opening area of the demagnetizing coil.

One pass through the opening while the current is turned on will demagnetize the work. However, it should be noted that if hardened parts are left in the demagnetizing coil while the current is switched "off", they will be found highly magnetized but may be demagnetized in the usual manner. This type equipment is normally designed for intermittent service operation as this meets practically all requirements. In special cases, such as belt conveyor or strip mills, continuously rated heavy duty demagnetizers are also available.

One style, known as the 10" Circular Heavy Duty Demagnetizer, features a ribbed cast housing for better cooling and protection. It is extremely efficient for demagnetizing objects that will pass through the opening.

Now that demagnetizing can be rapidly and easily accomplished with standard equipment designed to meet particular requirements, there is little excuse to risk the presence of magnetized tools in the modern shop.

PRODUCE FOR VICTORY!
Enlist
WITTEK
Automatic
ROLL FEEDS AND REEL STANDS
Wittek Automatic Roll Feeds and Reel Stands provide improved and simplified methods of punch press operation. They are easily mounted on any make or size punch press and assure fast, safe and accurate feeding under all conditions. Wittek Roll Feeds are made in four different types to meet all automatic feeding requirements.
Write for Descriptive Catalog
WITTEK MANUFACTURING CO.
4305-15 West 24th Place, Chicago, Illinois

Adjustable Spacing Collars

THE Dayton Rogers Mfg. Co., Minneapolis, Minn., announce a new precision adjustable spacing collar now made in 11 sizes that is well adapted to all gang milling setups.

The collars are so constructed that they can be used to advantage in accurate spacing all straddle milling, gang milling and multiple slotting milling machine setups. The use of shims is automatically eliminated.

These adjustable spacing collars fit all milling machine cutter arbors. They have a maximum adjustment of $\frac{1}{16}$" and are graduated by thousandths. However, a .00025 graduation is easily obtained.

Dayton-Rogers Mfg. Co., Dept. JC, Minneapolis, Minn., will supply further details at your request.

TCM High Speed Steel Conserves Strategic Alloys

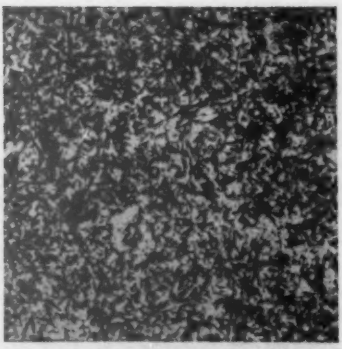
THE Jessop Steel Company, 610 Green Street, Washington, Pa., announces a new product—"TCM High-Speed Steel." It fully replaces 18-4-1 and is of particular importance now due to the shortage of strategic alloys which are so vital to our National War Program. TCM is a low Tungsten-Molybdenum Steel and cuts as well, or better than 18-4-1.

There is no change in operating equipment necessary in using TCM High-Speed Steel because it is heat treated in the same furnaces and the same atmospheres as 18-4-1 High Speed Steel. TCM Steel has a slightly lower hardening temperature which contributes to a lower cost in heat treating.

TCM Steel is lighter in weight than 18-4-1 which means more steel per dollar and more tools per pound of steel.

Jessop TCM High-Speed Steel conserves strategic alloys and meets demands for high-speed steels required in the war production effort. Free literature will be supplied upon request.

For further information and descriptive literature address Jessop Steel Co., 610 Green St., Washington, Pa.



Micro-Photo TCM Typical Hardened and Drawn Structure.

New JOHNSON *Furnace* ON THE OFFENSE

NO. 120 SPEEDS THE HEAT-TREATING OF HI-SPEED STEELS

When you want 2300° F in 30 minutes, for heat-treating hi-speed and carbon steels, use this economical Johnson No. 120. Saves up to 50% on gas consumption, compared to ordinary units. The temperature is easily regulated. Firebox, 13½"x7¾"x5", is heavily lined with insulating refractory. It's the furnace to use, too, for hardening punches, dies, parts and cutting tools. Equipped with G. E. Motor and Johnson Blower $129.50 F.O.B. Factory. Available with automatic Air-Gas Proportioner at extra cost.

FREE—Use Coupon for Free Catalog

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C. B. Babcock Co., 475 11th St., San Francisco

Johnson Gas Appliance Co.
500 E Ave. N. W., Cedar Rapids, Iowa.
Please send me Johnson's Free Catalog

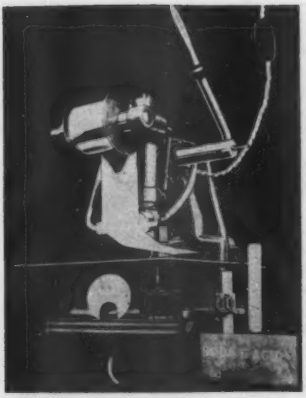
Name .....

Address .....

City ..... State .....

SHOP AIDS

Please Turn to Page 106.



Dials and Scales Quickly Marked

A NEW bench type marking machine, developed to mark parts and materials that formerly had to be engraved, is offered by The AcromarK Corp. This machine uses solid dies or interchangeable type and transfers color to the part, on the faces of the letters only, when used on enameled metals, bakelite and plastics.

With this machine numbers and graduations can be quickly marked on dials and scales, thereby saving engraving machines for work that cannot thus be handled. It is a fast means of accomplishing such marking and, in this day of shortages and substitutes, is also ideal for making name plates.

In operation, the heated die or type with the color transfer held over its face by an automatic feed mechanism impresses the mark into the material and leaves the desired color. Where a quantity of parts or name plates are to be impressed with the same lettering or numbering, the entire mark can be made in less time than it takes to engrave one letter with an engraving machine.

The machine illustrated will mark parts up to 1" thick within an area of 1" x 3" or less, depending upon the material. For larger work than the capacity of this machine permits, a larger model is now being developed.

Additional information is obtainable by writing The AcromarK Corp., 5-15 Morrell St., Elizabeth, N. J.

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Flame Hardening · Annealing · Aerocasing
Bar Stock Treating and Straightening
Heat Treating · Pack or Gas Carburizing
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THE LAKESIDE STEEL IMPROVEMENT CO.
5418 Lakeside Avenue — CLEVELAND, OHIO Phone Henderson 9100

$1,000,000,000

See Page 60.

Safety Featured in Leiman Sandblaster

THIS sandblast machine is equipped with a rotary table on which the work is held. The table extends into the interior of the sandblast machine and, while the outer edge of the table is being reloaded, the inside edge is in the interior under the blasting nozzles.

In practice, the table is operated by a motor which drives it at a pre-arranged rate of speed so that all of the shell or shell parts which are being sandblasted receive the full impact and cleaning effect of the material being used.

There are a number of nozzles which throw the sand in any direction or concentrate it on one point if desired. The actual sandblast operation is carried on inside the cabinet of the machine. No abrasive or dust can affect the operator on the outside.

A slotted, multiple rubber curtain prevents the abrasive or dust from blowing out. At the same time a power suction blower draws the dust from the interior of the machine itself.

The machine may be equipped with two or more nozzles and they are set at the proper angle according to the work to be done. They concentrate over the surface of the work so as to sandblast each piece in every part. The nozzles are of the suction type so that they draw the sand or the abrasive from the bottom of the machine where it is contained in a receptacle.

For additional information address Leiman Bros., Inc., 130-4 Christie St., Newark, N. J.

The STARRETT LINE
Is STRIPPED For ACTION

For more than 50 years, The L. S. Starrett Co. has offered tool buyers and users an almost unlimited selection of precision measuring tools. Now, in order to make available a larger supply of the more essential tools, we have eliminated slow-moving items, odd sizes and minor variations that have formerly been available. This change in policy will in no way limit the quality, accuracy or *usefulness* of Starrett Tools. It *will* permit us to concentrate our efforts on the types and sizes of tools that are most widely used and which are most essential in war production work.

THE L. S. STARRETT CO., Athol, Massachusetts, U. S. A.
World's Greatest Toolmakers

STARRETT
PRECISION TOOLS • DIAL INDICATORS • GROUND FLAT STOCK
HACKSAWS • METAL CUTTING BANDSAWS • STEEL TAPES

Three Means of Rapid Settings Available with Comparator

THE Amic Comparator is designed for accurate, convenient and quick checking of components either in the tool room or on the production line without fatigue to the eye. The working head of the Amic contains a dial with each small line representing 1/10,000 of one inch. A displacement of the measuring pin of .001" causes a movement of the hand on the dial of one full inch. The pointer moves in the plane of the scale. Thus any error in measuring due to parallel axis is avoided. This feature makes the operator's view exceptionally clear.

The interior mechanism of the instrument is simple, accurate and reliable. Two parallel flat springs mounted to two parallel vertical surfaces impart an angular movement to horizontal yoke the two ends. These ends are connected by a springband causing the semi-rotary movement of the horizontal axis. The horizontal axis is mounted in jewel bearing and carries the indicating hand. The basis of the indicating hand is formed from an aluminum disc rotating in a permanent magnetic field.

Three means of rapid setting are provided; rough setting by nut and thread on a column; fine setting by adjusting a screw on the anvil; and fine setting by zero adjustment of the dial.

Additional information is available. Address American Measuring Instruments Corp., 49 W. 22nd St., New York, N. Y.

BELOW is tubular part locked in simple checking fixture. Two De-Sta-Co Toggle Clamps assure quick, positive clamping . . . yet provide instant, easy release.

DE-STA-CO *Toggle* CLAMPS

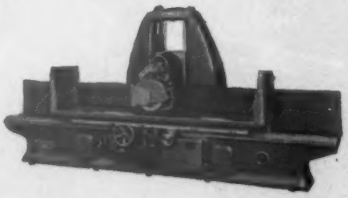
are used in the designing of fixtures for welding, drilling, machining, reaming, inspection, assembly or other production operations. Large line, all sizes, each clamp carefully engineered to assure smoothness of operation and give maximum life. Designed, manufactured and sold by a reliable concern, having over 25 years of manufacturing experience.

Bulletin No. 41 illustrates many practical uses and is a catalog of the many models and sizes . . . send for your copy today.

DETROIT STAMPING CO.
Established Over 25 Years
344 Midland Ave • Detroit, Mich.

Unusual Grinding Work Possible at Great Saving

SINCE its innovation, the Mattison high powered precision surface grinder has proven to be a great cost-reducing machine tool. In addition to the profitable handling of regular flat work, the wide range, large capacity and ruggedness of construction permit handling of unusual grinding work at a great saving in time over other methods, producing a fine finish with extreme accuracy.



An outstanding characteristic of the Mattison grinder is the massive double column support for wheel slide assembly. The housing in which the grinding wheel and its motor are mounted is exceptionally heavy and is carried on large horizontal ways of the vertical slide. This assembly is in turn supported between two heavy cast columns. Wide bearing surfaces on the inside face of each column and dovetail bearing surfaces on the front and back of each column provide an eight surface support, insuring stability regardless of direction of table travel.

Another important feature is the powerful, built-in motor construction, with the rotor being dynamically and electrically balanced and mounted directly on the wheel spindle.

To successfully remove stock with a grinding wheel, it is necessary to maintain full power. The instant the wheel slows down, due to slippage, cutting efficiency is lowered, capacity and quality suffer.

On the Mattison, the motor delivers its full power direct to the wheel and there is plenty of reserve to insure full wheel speed for fast grinding.

For further details address Mattison Machine Works, Dept. TD., Rockford, Ill.

- DRAW DIES
- NECKING DIES
- SIZING DIES
- TAPERING DIES
- BULLET DIES
- SWAGE DIES

"More cartridge cases per day — more per die," report leading ordnance plants who produce millions of cases weekly with TECO Carbide Dies. Not just quantity, but quality . . . with all on-size, smoothly finished and rejects eliminated. This extra capacity of TECO Carbide Dies is due to their controlled uniformity, density and hardness. Try a run!

TUNGSTEN ELECTRIC CORPORATION
574 39th Street • • • Union City, N. J.
Branch Office: 2906 Euclid Avenue, Cleveland, Ohio
Pioneers in Tungsten Carbides for Over a Quarter Century

Double Drill Life with Sellers Drill Grinder

PROGRESSIVE shops, large and small, seeking practical ways to save money have investigated the Sellers 4-G Drill Grinder. It reduces drilling costs, it is claimed, by producing free cutting, accurate drills that can be operated at the most efficient speeds. By greatly increasing the number of holes per grind, drill life is lengthened and drill inventory reduced.

This machine is recommended for grinding right hand twist drills and flat twist drills—2, 3 or 4 lip drills up to 2". It has an actual maximum capacity for 2 and 4 lip drills up to 3" diameter and for 3 lip drills up to 2 $\frac{5}{16}$" diameter. Lips are ground to equal length, angle and clearance. Clearance produced by the Sellers method is sufficient to insure free cutting without weakening cutting edges. This clearance is automatically determined by the machine for different sizes of drills.

Rough grinding is done by taking a succession of "slicing" cuts, holding the chuck stationary and passing the wheel across a narrow portion of the lip; turning the chuck slightly for each successive cut. In this way stock is removed from the whole face with remarkable rapidity. Then, by oscillating the chuck and passing the wheel lightly over the cutting edge, smooth and accurate finish is obtained.

William Sellers & Co., Inc., 1602 Hamilton St., Philadelphia, Pa., will supply descriptive literature upon request.

Complete Designing & Drafting Service

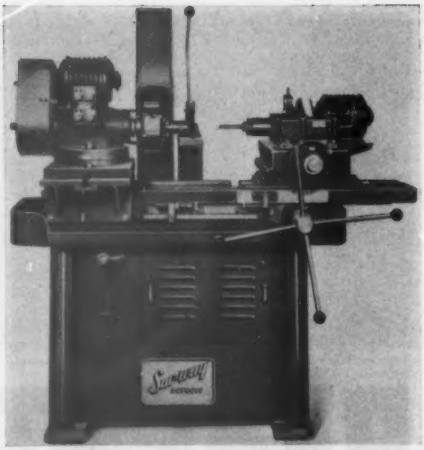
NOW AVAILABLE

OUR Designing and Drafting Department, long experienced in the creation and detailing of high precision machines, may be able to render you valuable assistance... Concentration of our machine shop on war production enables us to offer a part of our designing facilities for outside work.

Whether you require tool designing or creative development work, we suggest that you get in touch with us for particulars.

PACKAGE MACHINERY COMPANY
SPRINGFIELD, MASSACHUSETTS

Greater Flexibility with Sav-Way Grinder



AN internal precision grinder that will grind holes up to 9" deep and from ¼" to 18" in diameter, straight or tapered sides, has just been announced by Sav-Way Tool and Machining Co., Detroit, Mich. Thomas F. Saffady, general manager, claims that the Sav-Way Internal Grinder offers greater flexibility and will handle a wider range of work than formerly possible on any one model machine.

Construction of headstock is such that loosening of two nuts permits an adjustment to a distance of 3½" at right angles to the wheel traverse. This allows grinding of angles not heretofore reached by rotation of headstock or traverse of the wheel.

The grinding wheel head may be adjusted to .0001. The diamond holder is of the swing type with micrometer adjustment, enabling the operator to set the diamond accurately for sizing holes. The machine is equipped with automatic wheel guards and motors, bearings, coolant pump, electric controls and grinding spindle are leading standard makes.

The construction of the Sav-Way Internal Grinder is such that there can be absolutely no warpage of any basic part. Ease of hand operation is assured by an eccentric bushing which is adjustable to compensate for wear in the rack and gear.

Additional information is available on request. Write Sav-Way Tool and Machining Co., 13834 Jos. Campau, Detroit, Mich.

VERSATILITY PLUS!

Outstanding among the many features of the *Racine Variable Volume Hydraulic Pump* is its ability to do a time-and-money saving job in an almost endless variety of applications.

Racine Pumps are proving their versatility and efficiency in hundreds of widely different applications ranging from mining machinery to plastic molding. Our engineers will gladly show you how Racine Hydraulic Pumps and Valves can be profitably applied to your particular plant or industry. Write today!

DEPENDABLE VARIABLE HYDRAULIC POWER! Delivering hydraulic power in 12-20-30 gal. per minute capacities, Racine Pumps automatically maintain any desired pressure up to 1000 lbs. per sq. in. *without by passing of oil.* Racine's variable volume feature reduces horse-power consumption, lessens oil heating. Simplified construction provides smoother, quieter operation, *lasting dependability.*

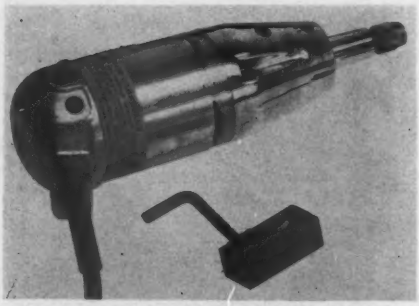
RACINE

TOOL AND MACHINE COMPANY

1764 State Street • Racine, Wisconsin

WRITE FOR NEW FREE CATALOG P-10-A

New Accessory for Filing and Honing Tools



H & H Research Co., of Detroit, manufacturers of reciprocating action portable electric filing and honing tools, announce an addition to their line of accessories which they feel opens a broad field of operations in most war plant polishing departments.

The accessory is a rubber pad impregnated with abrasive formed in any size up to 3" x 1" square and mounted on a 2" offset holder for use with their Senior Models. This "rubber abrasive polisher" can be ordered in grits ranging from 80 up to 180 and in various shapes within the above dimensions.

Primary uses are their ability to remove scratches and produce and maintain a mirror-like polished finish on such jobs as dies, molds, etc.

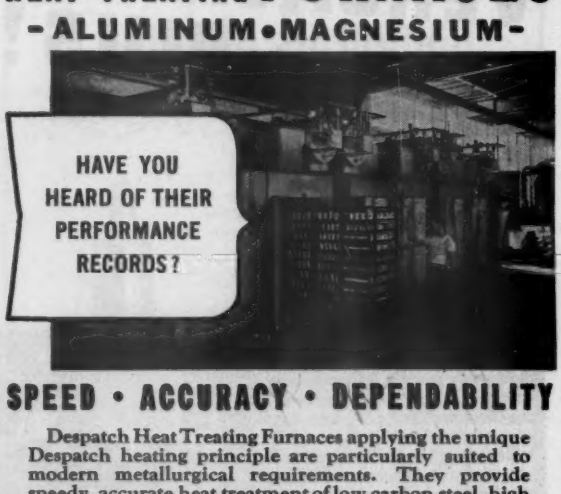
Already plants turning out aluminum parts for aviation and naval construction are finding big savings of time. Scratches produced by files (invisible to the human eye) are brought out plainly and removed while producing the polished surface. Many stages of emery cloth polishing operations, necessary in building up highly polished surfaces, are thus eliminated and the operation placed on a production basis.

Special files and hones, in addition to the accessory just announced, are illustrated in catalog HH-100. Address H & H Research Co., 12542 12th St., Detroit, Mich.

DESPATCH

HEAT TREATING FURNACES

-ALUMINUM•MAGNESIUM-



SPEED • ACCURACY • DEPENDABILITY

Despatch Heat Treating Furnaces applying the unique Despatch heating principle are particularly suited to modern metallurgical requirements. They provide speedy, accurate heat treatment of low carbon steel, high carbon steel, alloy steel parts, aluminum alloy, magnesium alloy, brass and other non-ferrous castings, forgings, sheets and shapes. Built in all sizes and types to suit your production problem.

WRITE TODAY for Bulletin No. 81-O *for complete information about the Despatch principle, also other improved features and photos of installations.*

DESPATCH OVEN COMPANY
MINNEAPOLIS MINNESOTA

Variety of Operations Quickly Handled

AMES Plain Precision Bench Lathes have been made and sold, almost without change, during the past 40 years, for use in tool rooms, manufacturing plants and laboratories. They will do the most accurate turning, drilling, grinding, milling and threading, are quickly set up for short or long jobs, start and stop momentarily, require little power and are compact.

They excel in the manufacture of interchangeable parts. In the manufacture of parts requiring a variety of operations, these plain precision bench lathes with their quick changing tools and attachments provide the only practical method.

Several characteristics set them apart from larger lathes. The headstocks are smaller, turn at high speeds, start and stop quicker and have no side play or end shake. The beds are plain, with no lead screws, carriages, change gears and housings to interfere with the operations of various attachments.

When quick-acting chuck closers, form and cut-off rests, lever operated tailstocks and large turrets are used, plain beds have a decided advantage because there are no protruding parts to interfere with or retard the swift action of those lever operated attachments.

Specifications may be obtained by writing B. C. Ames Co., Box A-4, Waltham, Mass.

ABOVE: Cutting keyways on compound angles

BELOW: SLOTMASTER installed on a round overarm milling machine

SLOTMASTER

eliminates many costly setups and hand operations

A slotting head that can be used on milling machines provides double duty facilities at a minimum of cost. It requires but little time to change-over from one head to the other and back again . . . The stroke of the ram is adjustable from 0 to 4" . . . The speeds range from 50 to 250 spm . . . The tool holder of the clapper-box type can be turned in any position . . . All of the working parts are of tool steel heat treated and ground to close tolerances . . . SLOTMASTER comes complete with pulleys, motor, belt and mounting adaptable to round overarm or other milling machines.

Send for 4-page catalog and give the specifications of the milling machines that you wish to equip.

Immediate deliveries on high priorities.

EXPERIMENTAL
TOOL & DIE Company
12609 Greiner DETROIT

End Brush for Welds Hard-To-Get-At

A NEW power-driven end brush of particular importance to war production is announced by the world's largest manufacturer of power-driven brushes.

The new brush is designed particularly to facilitate the cleaning of slag, scale, or oxidation from welds on inside corners as well as other locations which are difficult of access.

Developed by Osborn engineers after exhaustive study, research and testing under all conditions of use, this new brush will get into any space which is accessible for welding.

The new brush fills a vital need in the speed-up program called for by war production officials. The ability with this new brush to clean the difficult locations as thoroughly as those which are readily accessible eliminates a bottleneck in finished production.

An important feature of the new brush is the fact that it can be used in all standard power tools, whether air or electric. This facility is permitted by the special holder which has the additional advantage of permitting instant replacement of the brush part.

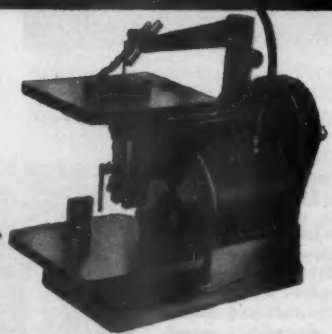
The brush proper measures only ⅛" across the end or brushing surface and may be had with any one of three diameters of wire —.025", .035" and .090".

Full details from The Osborn Mfg. Co., Brush Div., 5403 Hamilton Ave., Cleveland, O.

TWO MACHINES IN ONE!

For Die-Filing Use Top Table in Position Shown.

For Punch or Blind-Hole Filing Tilt Top Table Back, Use Lower Table.



DIE TABLE Filing From Below

PUNCH TABLE Filing From Above

No more hand filing of intricate jobs or inaccessible parts! With this universal machine you can take care of all filing and lapping jobs as they come along. Stroke fully adjustable from 0 to 1½". Two Speeds. Fully enclosed motor. Ball Bearings throughout. No dripping of oil. No waste of unused file sections.

Write for Descriptive Circular.

MARBURG BROTHERS, INC.
Exclusive Distributors
90 West Street New York, N. Y.

Finishing Methods and Equipment

(Continued from Page 40)

The tail adaptor is conveniently moved back and forth by means of a foot lever and the operator has both hands free to load, file and unload. When chutes are installed to collect the pieces and deliver them into a box under the bench, and pins for the unfinished pieces are provided on top of the bench, high production is attainable in a range from a few hundred pieces to twenty-five hundred or more per hour, depending upon size and shape.

The edging lathe is usually permanently set up and the adaptors are the only special fixtures required for a given job. Often, in large installations, one or more bench lathe heads without tail spindles and with draw-in or expanding collet chucks actuated by foot or hand levers are set up. The collets may have straight bores or they may be bored to fit special contours. Sometimes these collet lathe heads with individual motors are set up on portable benches and moved up to molding presses which are operating on a long cycle so that the molders can utilize free time for edging. The lathe is then available also for unscrewing thread plugs and rings.

Some molded parts made of either thermosetting or thermoplastics material can be edged by tumbling. This is a good method for small articles which are expensive to handle individually in other ways and on which the flash can be everywhere exposed to the tumbling action. It is difficult to tumble flash from deep recesses and not desirable when the more exposed surfaces may be battered by the severe action necessary to remove the flash from such protected areas. The tumbling process can also be used for polishing the same kinds of articles which are suited to tumble edging.

Tumbling is done in rotating hardwood barrels which are sometimes mounted on trunnions so they can be tipped forward to discharge from the end. This is a convenient arrangement for barrels of large diameter because cleaning is thus accomplished easily. Smaller barrels are sometimes made octagonal in shape and are mounted with bearings at the ends. In this case one side of the barrel is removable for loading and unloading and the depth of the barrel should not be too great for

Douglas PRECISION SLOTTER

FOR TOOLROOM AND PRODUCTION

Swiveling ram head and tool holder, automatic circular table, and independent automatic feeds in all directions.

Prompt Delivery by Large-Scale Production

Built with 7", 8", 10" Stroke

DOUGLAS MACHINERY CO., INC.

150 BROADWAY, NEW YORK, N. Y., Dept. 80-6

arm reach. As the loaded barrel rotates at 30 to 100 rpm the charge climbs up the sides and then falls back. This falling breaks the flash or agitates auxiliary tumbling material which breaks it.

Factors which produce more severe tumbing action are larger diameter barrels, higher rotating speeds, heavier molded pieces, the use of wood blocks added to the charge, smaller charges in the barrels and longer tumbling time. These factors must be considered and adjustments made for each job to produce good pieces in a satisfactory operating time. Both large and small tumbling barrels can be used advantageously in plastics finishing. A choice of several speeds should be available. Tumbling operations require from 15 minutes to several hours per batch and it is economical to have a battery of several barrels set up in the finishing department.

Edging can also be accomplished by the abrasive action of various grinding media. Belt sanders and cloth wheels impregnated with various abrasives are the principal means employed. Thermosetting materials may be sanded dry or wet, but thermoplastics should be sanded wet. The powdery material removed from thermosetting materials does not load the sanding belts excessively and the heat generated does not cause the surface to gum. On the other hand, thermoplastics will load a dry belt quickly and then the friction will generate sufficient heat to melt the surface of the molded piece. Vertical and horizontal belt sanders are available in standard designs for either wet or dry sanding. Disc sanders find many uses in the finishing department. When *precision* sanding is to be done, it is well to use new sanding belts or discs and not try to re-use belts even slightly worn. Worn belts can be used for other work which does not require extremely careful sanding. The usual grain sizes for plastics sanding range from 80 to 200. If too coarse grain is used, deep scratches will result, and thermoplastics may load the belt even with sufficient water. If too fine grain is used, the belt may glaze and burn. Many sanding operations can be carried out by using only one grain size, although for the best finish, use first a coarse and then a fine belt. This is easily accomplished with two machines placed side by side; thus the operator need not put a piece down until he has completed both operations. Sanding is not always a fast operation and production rates will

LOOK! "NO-SPLASH"
A NEW FEATURE IN WET GRINDING
Hammond
"10" and "14"
CARBIDE TOOL GRINDERS
An Innovation! Scientifically designed, concealed wheel guards keep you dry while you grind "WET." No Splash! No Spray! New guards permit greater working area around wheels, full view—speeds up production.
WRITE FOR LITERATURE
Complete Line—Chipbreaker and Carbide Tool Grinders
Hammond Machinery Builders INC.

vary from 50 to several hundred per hour, depending upon the amount of material to be removed.

Grinding on cloth wheels is an effective method for removing small ridges of flash from molded parts. This method is especially good for those thermosetting materials which have a filler that shows a grainy interior when sanded. Many grades of abrasives are made with grease or wax binders and may be had in brick or stick form. The buffing stand which is used usually consists of two wheel spindles with a drive between. For the edging operation rather coarse abrasives are used and the operation is called grinding or polishing as opposed to the finer operation of buffing or color buffing which is employed to bring out the luster. In general, the same type of muslin buffing wheels are used for grinding and buffing, but the abrasives are very different. Speeds of 1200 rpm for 10" and 12" wheels are the usual practice. Plenty of power should be available for grinding since considerable torque is required to turn a 12" wheel under a heavy pressure. Discussion of this method of finishing will be continued in a later section on polishing.

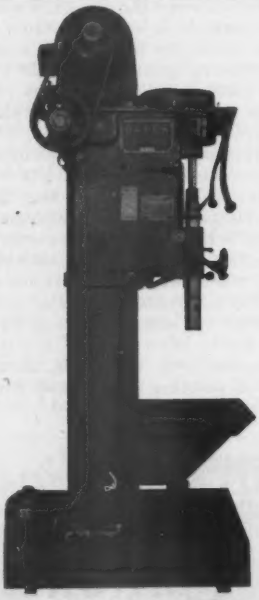
Flash trimming dies are often warranted when a large number of holes of odd shapes require edging. Such dies may be designed and built to pierce the flash from 10 to 50 or even more holes and to also trim the contours at one stroke of the press. Small dies can be set in foot-operated presses, while larger dies require power presses. The cost of a flash trimming die is considerable and further, when a large number of holes are involved, it may not be possible to lay out the die until a representative sample is available from the production run on the mold. Such a sample is required to obtain exact hole locations. The restraining action of the cores which form the holes make it difficult to predict the amount of shrinkage. When cores are relatively far apart shrinkage will be approximately normal, but with close spacing it may be much less than expected. Despite the disadvantage of cost and the delay which may be encountered in laying out a die, this method is economical when large quantities are involved. The alternate method of reaming flash from odd shaped holes is likely to carry a heavy labor cost.

For thermosetting materials, a nail point on the piercing punch will break

(Continued on Page 99)

WESTINGHOUSE
welds "down-hand on
C-F POSITIONERS
Welding motor frames for 100 or 125 ton Westinghouse Diesel Electric Locomotives on Cullen-Friestedt Positioner. Such is the job being done here and the war production lines all over the country are utilizing these fast, safe, efficient machines to build other machines for victory.
CULLEN-FRIESTEDT CO.
● Our booklet WP-20 shows you how C-F Positioners save time and dollars in many industries . . . . . Write for your copy.

BAKER HEAVY DUTY DRILL



new - sturdy - efficient

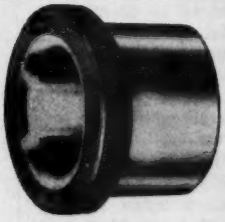
The Model No. 150 Heavy Duty Drill has ample capacity to drive 1½" diameter high speed twist drills. It is also adapted to boring, counterboring, facing, forming and tapping operations.

To give increased flexibility to the machine the vertical column assembly is of 2-piece design; lower frame which bolts to base arranged to carry standard plan table. The entire upper unit assembly with speed and feed train drives for rotating the spindles and for feeding spindles is mounted on the lower frame. Twelve quick changes of speed are provided.

BAKER BROS., INC.

TOLEDO OHIO

Further details are contained in a new attractive bulletin which is now available.



★ Here's good news for defense contractors (bad news for the Axis). You spend less time and money tooling up for special work by using Acme Standard Drill Jig Bushings.

For, in addition to the A.S.A. (American Standards Ass'n.) Standard, a wider range of lengths and outside diameters are included in the Acme Standard line (see red listings in Acme's catalog). If your particular requirements are not listed, count on Acme precision manufacture and prompt service.

TOOL ROOM—PRODUCTION SUPT.:

We are specialists in flat lapping for measuring instruments and sealing surfaces. Let us refinish your worn snap-gauge and comparator anvils or tables to true flatness.

Acme Advice is Yours for the Asking!

ACME INDUSTRIAL COMPANY

Makers of Hardened and Ground Precision Parts

206 N. Laflin St. Chicago, Ill. MONroe 4122

Rawhide HAMMERS Rawhide MALLETS

• Genuine Java Water Buffalo Hide replaceable faces in malleable head.

No.	Dia. in ins.	Wgt. in lbs.
0	1	½
1	1¼	1⅛
2	1½	1⅝
3	1¾	2¼
4	2	4
5	2¾	5½

• A finely balanced Tool with tough, resilient Java Water Buffalo Rawhide heads.

Not Loaded				Loaded Mallets			
No.	Dia. Ins.	Lgt. Ins.	Wt. Ozs.	No.	Dia. Ins.	Lgt. Ins.	Wt. Ozs.
0	1	2⅛	2	7	1¼	3	8
1	1¼	3	3½	8	1½	3½	12
2	1½	3¼	6	9	1¾	3⅝	16
3	1¾	3¼	7½	10	2	3½	20
4	2	3½	10	11	2¾	4¼	42
5	2¾	4¼	21				
6	2¾	4¾	23				

• These are the tough, resilient, long-lasting Rawhide faces made from specially treated Java Water Buffalo hide for use in Chicago Rawhide Hammers.

CHICAGO Rawhide MFG. CO.

1280 ELSTON AVE. ★ CHICAGO, ILLINOIS.

BARTELT TOOL SETTING GAUGE

Designed for speedy, accurate setting of boring tools and many other tool setting applications.

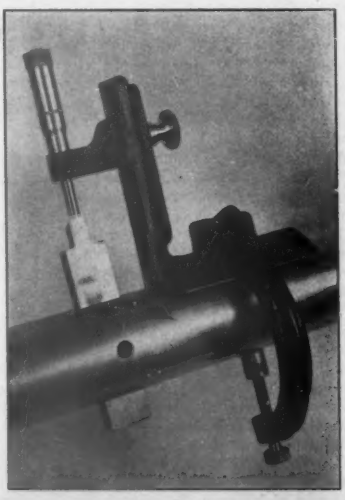
Saves time, labor and costly errors.

A model with a dial indicator instead of micrometer is also available.

USES:

Setting cutting tools in boring bars.
Milling machine set up
Planer set up
As a height gauge
As a depth gauge
Layout and inspection

Send for illustrated literature.



BARTELT ENGINEERING COMPANY

1214 Partridge Avenue - - BELOIT, WISCONSIN

PUBLICATION PREVIEWS

Sales and Technical Literature

Send Requests on Company Letterhead

VIMCO—"THE LIGHT ON THE SPOT"—Amply illustrated in Bulletin M-5 are standard stock combinations of machine lights that ideally answer the need for localized high intensity lighting. Because of the complete interchangeability of Vimco parts, scores of other assemblies are obtainable. Address Vimco Mfg. Co., 117 Chenango St., Buffalo, N. Y., for your copy.

AUTOMATIC STAKING MACHINE—an inexpensive machine designed to meet assembly problems—is the subject of Bulletin G. Outstanding features of this machine include: interchangeability and uniformity of finished work; adjustable hammer blow and foot treadle operation. Specifications and diagrams of the machine are given. Webber Machine Corp., Rochester, N. Y., will send this bulletin at your request.

"HARD-TO-GET"—Tamms Silica Company's new catalog and price list covering paints, sundries and builders' supplies is now available. This catalog contains complete information on those "hard-to-get" products that you have difficulty in locating and should be a valuable addition to your files. Address Tamms Silica Co., 228 N. LaSalle St., Chicago, Ill.

COLUMBIAN VISES—Catalog No. 40-AM is a compact, illustrated listing of the wide selection of Columbian Vises. Swivel base vises for holding work at different angles as well as adjustable jaw vises for irregular or tapered work are available in all sizes. Address requests to The Columbian Vise and Mfg. Co., 9021 Bessemer Ave., Cleveland, O.

AN ENTIRELY NEW PRINCIPLE IN WHEEL DRESSING—features the current broadside offered by Wheel Trueing Tool Co., 3204 W. Davison, Detroit, Mich. Known as the "Tru-Line Principle", the new, fully patented design utilizes two or more diamonds cutting in the same track, pointing to the wheel center and requiring no changing, turning or resetting by the operator. Exhaustive tests, it is said, demonstrate that the new tool materially speeds production, increases accuracy and cuts dressing costs.

JESSOP WASHINGTON TOOL STEEL—is proving successful because of the close control of grain size exercised in every heat. Bulletin 142 contains interesting action photographs and description of this steel. Tempers and applications are given. Hot working and heat treatment charts and forging, annealing, hardening and tempering data are included. Bulletin 142 may be obtained by writing Jessop Steel Co., Washington, Pa.

R-S AUTOMATIC DIE HEADS—Models for use on turret or hand screw machines where head is stationary and work revolves, for cutting threads of fine pitch where no float is needed and for use in automatic screw machines where the die head revolves and the work does not are described and illustrated in Bulletin No. 5. Principal dimensions are also given for each model. Send for your copy of Bulletin No. 5. Address the Rickert-Shafer Co., Dept. RS, Erie, Pa.

RADIAL DRILL BULLETIN—This bulletin describes one of the new Canedy-Otto precision built drilling units. This unit is simple in design yet has ample controls and flexibility to meet the needs of the more accurate jobs of production. Canedy-Otto Mfg. Co., Dept. TD, Chicago Heights, Ill., will send Bulletin No. 116 on request.

TALIDE METAL FOR WEAR RESISTANCE—Tungsten carbide pieces of any size, diameter or length can be made by this new process. Catalog No. 41 lists and pictures the many tungsten carbide products. A solid tungsten carbide roll 3" diameter by 16" long, illustrated on Page 16, is an example of the size piece that can be produced. For your copy of Catalog No. 41 address Metal Carbides Corp., 105 E. Indianola Ave., Youngstown, O.

ELECTRIC FURNACE PICTORIAL—The Electric Furnace Co., Dept. TD, Salem, O., will send upon request a 28-page pictorial showing a few of the numerous types of equipment available. This company designs and manufactures oil fired, gas fired and electric furnaces and auxiliary apparatus for the heat treatment of finished and semi-finished materials.

PUBLICATION PREVIEWS

INSTRUCTION CARDS FREE—Diamond Tool Co., 940 E. 41 St., Chicago, Ill., will mail free grinder instruction cards giving important information on precision dressing.

HAND SPRING WINDER—A folder illustrating the Blaner Universal Hand Spring Winder is now available without charge from The John Blaner Co., Dept. M5, Sharon, Pa. This hand tool is built in five sizes and is designed to make springs quickly and efficiently in all industries without the use of a lathe.

TAPS—The Wood & Spencer Co., 1932 E. 61 St., Cleveland, O., manufacturers of taps, offer Catalog No. 5 for your convenience. In its pages you will find many tables such as proper drill size for tapped holes—standard dimensions of taps—thread dimensions and standard tolerances.

NEW DRIVE-ALL CIRCULAR—Older machine tools can be converted to higher speeds and heavier feeds. This circular shows how to gain this greater production now. Actual shop applications on a wide range of machines are illustrated. Direct requests to Drive-All Mfg., 3400 Conner Ave., Detroit, Mich.

PLASTICS DIGEST—Published monthly by Plastics Publishing Co., P. O. Box 523, New Brunswick, N. J., supplies the need for an abstracting periodical in the field of plastics and synthetic rubber.

Finishing Methods and Equipment

(Continued from Page 95)

the flash and the punch body will size the hole at the flash line. Thermoplastics materials should have punches which shear the flash off rather than break it. Very slight misalignments of punches or supports can cause breakage in thermosetting pieces.

CREDITS—

Gordon B. Thayer, Saran Development Laboratory, The Dow Chemical Co., Midland, Mich.—Technical Consultant. Photographs—H. D. Justi & Sons, Inc., Philadelphia, Pa. (molded teeth); Porter Cable Machine Co., Syracuse, N. Y. (grinder); Walls Sales Corporation, New York, N. Y. (grinder); Delta Manufacturing Co., Milwaukee, Wis. (grinder); Rudolph R. Siebert, Rochester, N. Y. (tumbling barrels); Hammond Machinery Builders, Inc., Kalamazoo, Mich. (grinder).

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An Overnight SUCCESS!

Mead's sensational new FOOT CONTROL for air-operated devices speeds production — frees your operators' hands! For use with all Mead Air Clamps and other air-operated devices controlling up to 100 pounds PSI. Easily mounted for foot, knee, elbow, hand or automatic operation.

Two types: Model "ON" releases work when pedal is pressed—Model "OFF" holds work when pedal is pressed. Two models for release or shut-off. This inexpensive, efficient foot-controlled air-valve will pay for itself in a few hours. Investigate now. Write!

MEAD SPECIALTIES CO.

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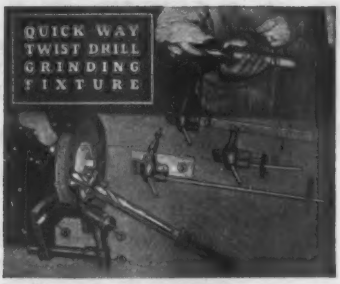
NEW DRILL GRINDING FIXTURE



A WIDER RANGE of usefulness in grinding drills, than any $500 (or costlier) machine affords today, is available through the new, improved Quick Way twist drill grinding fixture. These inexpensive fixtures are built in 3 sizes and include everything necessary to grind any drill from a 1/4" to 2 3/8". It is so simple that any apprentice can learn to use it in a few minutes. Because the correct angles and clearances for all hard and soft metals are permanently built into the fixture, there are no adjustments to make and so no possibility of incorrect grinding.

This fixture saves one half to three fourths the time consumed by hand grinding. It also cuts in half the amount of metal ground away by eliminating the errors of hand grinding. It doubles the life of twist drills and so pays for itself within a few weeks at the longest. As there are no moving parts subject to wear, the Quick Way fixture will last indefinitely. Exclusive Distributors—

Industrial Engineering Co., Inc.

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Nine Models

SAVE 50% to 60%

Model S-1

SAVE 50% to 60% of the labor over hand methods in the cost of making precision Dies, Gages, Cams, Templates and similar products requiring rapid and accurate sawing, filing and lapping operations.

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A complete line, both bench and pedestal types, for work in materials up to 3" thick.

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We also build:
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GET 25% MORE PRODUCTION
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LOW INSTALLATION COST
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Any lathe or screw machine, shaper, milling machine, punch press or similar equipment now driven by overhead belting can be MODERNIZED at LOW COST with a CULLMAN MOTOR DRIVE.

Machines with CULLMAN Drives operate smoothly and quietly, with instantaneous control, resulting in increased efficiency of operator and machine of more than 25%.

The CULLMAN Drive is easy to install. On most machines only four bolts do the job. CULLMAN Drives are made for motors ranging from ¼ to 15 H. P.

Let CULLMAN Drives give the extra efficiency demanded for war time produc-

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Large Shell Cases Must Conform To Close Limits.

Our skilled mechanics, working with our complete precision equipment, are fully capable of producing the kind of gages, dies and tools that help keep the War Production System in high gear.

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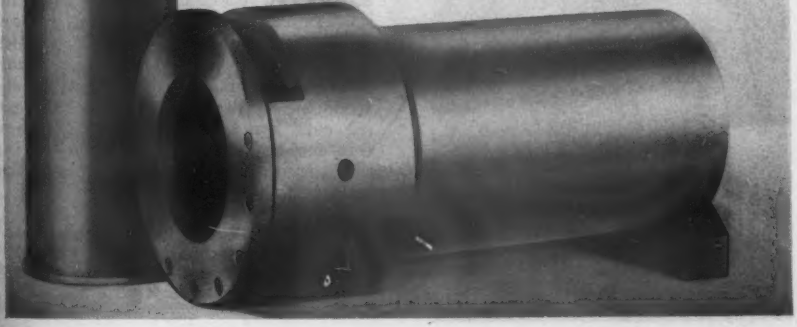
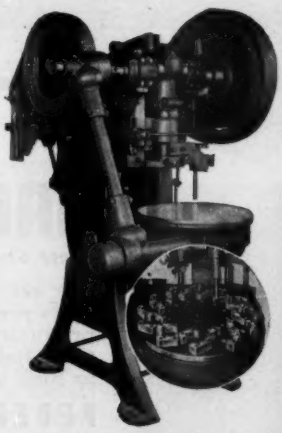


Timely Dial Feed Press for Armament Program

TIMELY to the accelerated armament program is the announcement of the new Federal Multiple Dial Feed Press by the Federal Press Company, Elkhart, Ind. Positive indexing and locking mechanism of the dial feed permits unusually high speed with accuracy and safety.

In the Federal Dial Feed, all moving parts are enclosed except the dial plate itself, removing the possibility of injury to the operator. Indexing is obtained positively and accurately by a cam and gear arrangement in connection with the crankshaft.

The cam allows the dial to be indexed in any part of the revolution of the crankshaft from 90° to 180°. Thus, there can be obtained a long or short dwell of dial, allowing the operator whatever time is necessary to inject the work into the fixture in the dial station.



Features of the precision construction of the new Federal Open-Back, Inclinable Press with dial feed are: the press is checked from six points to a tolerance of .0015; new safety lock feature makes it possible to set or adjust dies while the flywheel is in operation; bearing caps are split vertically, resting on reinforced frame, thus transmitting shock from the thrust and return strokes directly to the frame.

Complete illustration and description are furnished in a new Federal Press Bulletin. Address Federal Press Company, Dept. DF, Elkhart, Ind.

VITAL AS BULLETS
Machine tools and their accessories such as Drill Bushings are as vital today as the war equipment they produce. To help guard against delays, a large stock of Universal Drill Bushings in standard sizes are on hand, ready for quick delivery. Universals with superfinished bores offer more for your bushing dollar. Write for prices and data sheets.
UNIVERSAL
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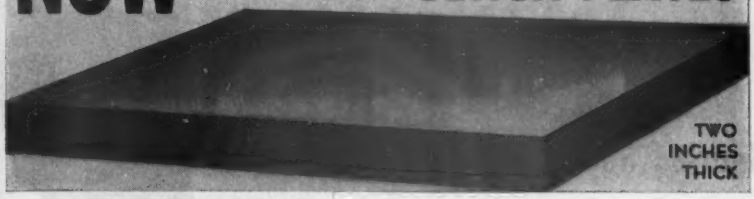
Frankenmuth, Mich.

NOW YOU CAN GET CHALLENGE SEMI-STEEL BENCH PLATES

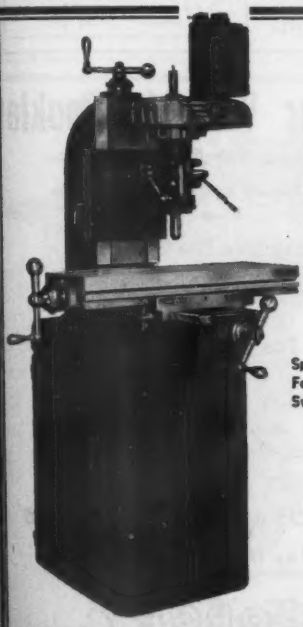


. . . PRECISION GROUND!

411

These small semi-steel bench plates are now available for many types of work, particularly inspection and assembly of small parts. They provide an accurate surface and are built for lasting strength and rigidity. All four sides are machined at exact right angles to the top. Challenge Precision Ground Bench Plates are made in nine standard sizes, from 8x10 to 18x18 inches. Other sizes to order. Prompt delivery on standard sizes. Write for new illustrated catalog on this and other precision equipment.

Challenge **THE CHALLENGE MACHINERY CO.**
GRAND HAVEN, MICHIGAN, U.S.A.



Holland 8" x 16"
VERTICAL MILLING MACHINE

For Tool Rooms and Armament Production

Here is an ideal machine for work on tools, dies and molds. Available with either low or high speed motor, this miller is ruggedly designed, with the column cast solid with the knee to eliminate vibration. Rigid table support.

Specifications: Table Size, 8" x 26", Table Range, 8" x 16". Vertical Feeds, 3" on Quill, 8" on Quill Head. Collet Capacity, ½". Swivel Head graduated to 90° left and right. Dial Graduations in .001".

The high speed head, a self-contained motor-driven unit, can be turned to any angle parallel with the longitudinal feed. Chrome-plated quill has lever-feed with depth stop graduated in thousandths. Feed dials are large for easy reading. Spindle mounted on precision pre-loaded ball bearings.

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The Knurled head is a great time saver. Greasy, oily fingers welcome the Knurled non-skid grip . . . no slip, no lost motion.

And—the Knurling also enables quick, easy locking after countersinking.

The smooth band at the base of the head takes the radial thrusts.

Deliveries better than average — and no premium price. So—send for details, and make your next order "Unbrako".

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Our new expanded plant allows us to give the same standard of service to a large number of companies.

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The Majestic Internal Grinder meets the exacting requirements for internal grinding operations in the tool room and die shop. It offers reliable, balanced operation, maximum output and valuable help for all-out production.

Sturdy and durable, the Majestic Internal Grinder is equipped with Parker spindle and motor. Parker ball bearings and standard rotor and stator assure perfect balance for smooth spindle movement.

An adjustable work head has a graduated base which swivels 90 degrees on each side of the center for taper grinding.

Send for valuable circular.

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CUTTING FLUID HANDBOOK—is a 32-page book of technical data covering the machining of important materials which have recently appeared on the scene in the metal working industry.

Nickel, stainless steel, copper alloys, aluminum and high speed steels are each separately discussed from every machining angle. Various other subjects covered are: The Cemented Carbides as used in Metal-Cutting Tools; Tool Support and Tool Holders; Suggested Grinding Practice and Common Errors in Tool Design. Many illustrations and valuable charts on speeds and feeds, cutting rakes and correct grinding wheels amplify this handbook.

This book is a worthwhile addition to any technical reference library and can be obtained free of charge by writing Gulf Oil Corp., 3804 Gulf Bldg., Pittsburgh, Pa., or The TOOL & DIE Journal.

NEW BOOKLET DESCRIBES ELECTRICAL INSTRUMENTS—A new 34-page booklet announced by Westinghouse Electric & Mfg. Co. lists all instrument types for specific applications on an instrument selector chart. Special features, specification data and full-scale range of standard ratings are included.

Design features and physical characteristics of meter pivots, springs, pointers and cases are described with a note on manufacturing methods and testing facilities are also included.

Reproduced in the booklet are 120 photographs, 44 representative meter dials and 13 types of strip and circular charts.

A copy of booklet B-3013 may be secured from Dept. 7-N-20, Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.

MILLING SPEED AND FEED CALCULATOR—This clever device constitutes a timely contribution to the national war effort because it gives milling machine setup men and operators a quick and positive method of selecting the correct speed and feed. This will reduce cutter breakage and "burning" or step up production where machines are run over-cautiously slow.

With each calculator is also enclosed a booklet containing complete instructions for its operation. They will be promptly mailed upon request made to Cincinnati Milling Machine & Cincinnati Grinders, Inc., Dept. NC, Cincinnati, O. (Price 50¢).

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★ High speed steel, straight flute reamers with diameters from ½" to 3" can be resized economically. A forging process increases diameter as much as .020" to .030". Saves valuable time and critical material. Users report longer runs.

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In offering this service, the Package Machinery Co. makes it clear that they will neither buy nor sell these machines. Their aim is purely to assist companies which cannot obtain sufficiently high priorities to insure delivery of new machines.

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Made Easy

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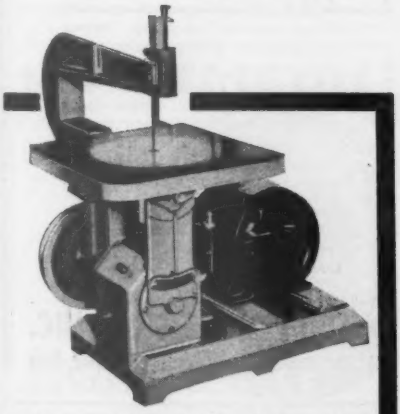

Can be used for all kinds of die making. The overarm is constructed so that the file and saw attachments may be interchanged with little effort. The holddown fingers are attached directly to the overarm. Working surface of the table, which tilts two directions, is entirely clear. An improved type of chuck, consisting of movable hardened jaws, holds both saws and files. Screw adjustment makes changes easy and fast.

The ATLAS Die-Filing Machine has every possible advantage for rapid and accurate diemaking — AT A BIG SAVING OF LABOR.

Price, complete with motor — $125.00 Net
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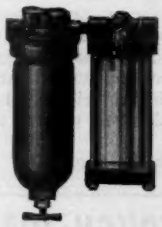

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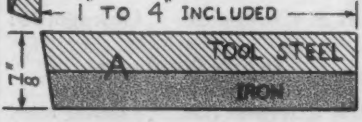

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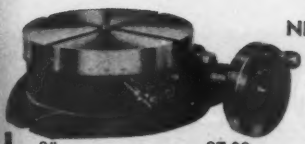

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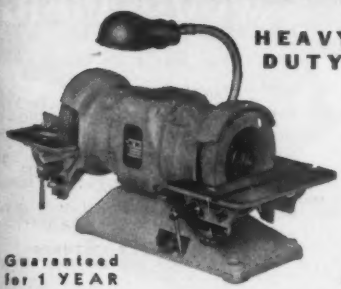

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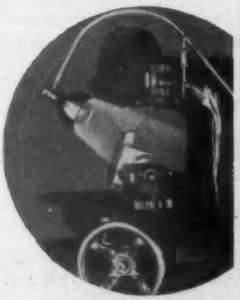

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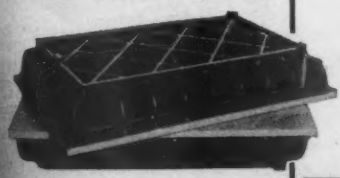

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A directory of products listing for ready reference the names of manufacturers and dealers whose sales to The TOOL & DIE Journal readers have established them as dependable in every sense of the word. They merit your consideration. Complete information about any product may be had upon request made to the firm listed or to us. Your mention of The TOOL & DIE Journal will be appreciated.

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Norton Co., Worcester, Mass. (Behr-Manning Div.)
Wallis Sales Corp., 97 Warren St., New York, N. Y.

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Sommer & Adams Co., The, 18511 Euclid Ave., Cleveland, O.

BENCHES
Challenge Machinery Co., Grand Haven, Mich.

BENDERS—Metal
O'Neil-Irwin Mfg. Co., 315 8th Ave., So., Minneapolis, Minn.

BLADES—Cutting Off
Empire Tool Co., 8780 Grinnell Ave., Detroit, Mich.

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Johnson Gas Appliance Company, 560 E Avenue, N.W., Cedar Rapids, Ia.

BOLTS—Stripper
Danly Machine Specialties, Inc., 2100 So. 52nd Ave., Chicago, Ill.
Die Supply Co., 1390 E. 30th St., Cleveland, O.
Holo-Krome Screw Corp., Hartford, Conn.

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Precision Tool Co., The, P. O. Box 155, Brooklyn, N. Y.

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McKenna Metals Company, 500 Lloyd Ave., Latrobe, Pa.
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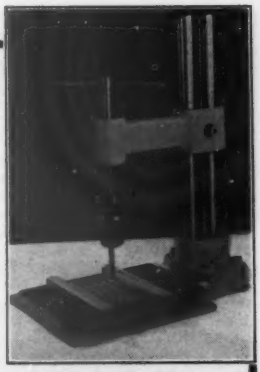

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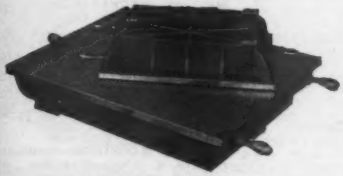

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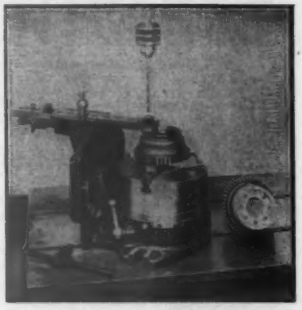

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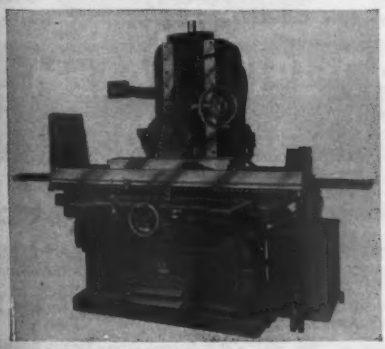

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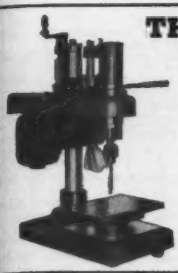

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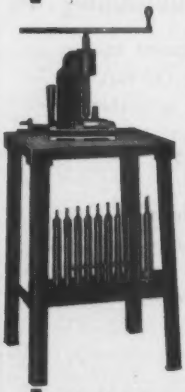

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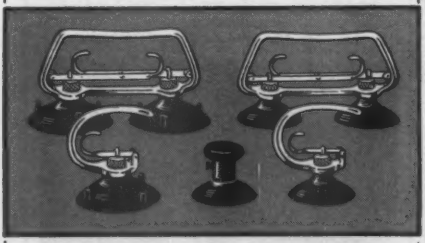

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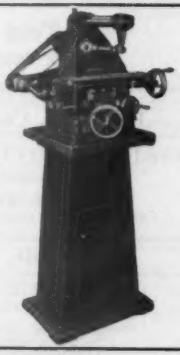

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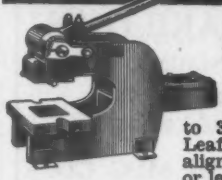

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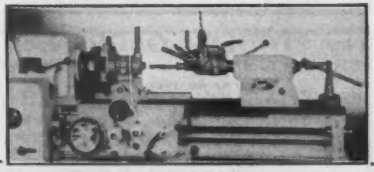

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Advertisers Index

Abrasive Engineering Co. 106
Ace Tool and Die Company 122
Acme Industrial Company 96
Acme Tool Company 119
AcromarK Corporation, The 121
Ajax Steel & Forge Company 104
Alofs Manufacturing Company 62
Allegheny Ludlum Steel Corporation ... 9
American Broach & Machine Company..
American Industrial Publishers 32
Anderson & Brown Sales Agency 35
Armature Company, The 68
Armstrong-Blum Mfg. Co. 128
Armstrong Bros. Tool Company 115
Atlantic India Rubber Co. 120
Atlantic Machinery Corp. 74
Atlas Equipment Company 107
Atlas Press Company .....

Baker Brothers, Inc. 96
Baldor Electric Co. 109
Bartelt Engineering Company 97
Barth Stamping & Machine Works..120, 123
Bissett Steel Company 107
Black Drill Company .....
Blanchard Machine Company 10
Bokum Tool Company .....
Boyar-Schultz Corporation 26
Bunell Machine & Tool Company 66, 123
Burke Machine Tool Co. 124
Busch Company, J. C. 113

Carboloy Company, Inc. .....
Carborundum Company, The 15
Cerro de Pasco Copper Corporation ....
Challenge Machinery Company 103
Chicago Rawhide Mfg. Company 97
Chicago Wheel and Mfg. Company 27
Cleveland Universal Jig Company 122
Colonial Broach Company .....
Colonial Bushings, Inc. 117
Columbia Tool Steel Company 115
Conrad & Moser 122
Continental Machines, Inc. 56, 57
Cullen-Friestedt Company 95
Cullman Wheel Company 101

Danly Machine Specialties, Inc. 24
Darwin & Milner, Inc. .....
Davis Tool & Engineering Company 122
Dayton Rogers Mfg. Company .....
Dearborn Gage Company 28
Delta Manufacturing Company .....
Denning Manufacturing Company 123
Despatch Oven Company 90
Detroit Stamping Company 86
Diamond Tool Company 111
Die Supply Company 77
DoAll Co., Inc., The 11
Douglas Machinery Company 78, 93
Dreis and Krump Mfg. Company 122
Drexel-Betz Company 122
Drive-All Manufacturing Co. 64, 65
Dumore Company, The 25
Dure Metal Products Company 126
Dykem Company .....

Eastern Etching & Mfg. Co. 21
Elyria Belting & Machinery Co. 68
Empire Tool Company .....
Enterprise Machine Parts Corp. 12, 122
Ex-Cell-O Corporation 18
Excelsior Tool & Machine Co. 108
Experimental Tool & Die Company 91

Federal Products Corporation .....
Federal Tool Corp. 101
Firth-Sterling Steel Company 19
Forging and Casting Corporation, The 2

Gairing Tool Company .....
Gallmeyer & Livingston Company 113
General Die & Tool Co. 123
Gibson Co., William D. 79
Gilron Products Co. 108
Gorton Machine Company, George 50

Haico Products Company 80
Hamilton Tool Company 115, 119, 123
Hammond Machinery Builders, Inc. 94
Hardinge Brothers, Inc. 3
Hartford Special Machinery Co. 113
Holo-Krome Screw Corp. 5
Hovis Screwlock Company 14

Illinois Tool Works .....
Industrial Engineering Co. 100
Industrial Machine Company, The 123

Jackson Machine & Tool Co. 76
Jefferson Machine Tool Company ...121, 124
Jessop Steel Company 22
Johnson Gas Appliance Company 83

Kearney & Trecker Corporation 36
Kelley Corporation, J. W. 117
Kiffer Tool & Die Co. 123
Knu-Vise, Inc. .....
Koch Test Indicator, The 121
Koebel Diamond Tool Co. .....

L-W Chuck Company 59
Lafayette Tool and Supply Co. 109
Lakeside Steel Improvement Company .. 84
Lang Machinery Company 68
Leslie Welding Company 121
Lima Electric Motor Co., The .....
Linderme Machine and Tool Company .. 70
Lucas & Son, Inc., J. L. 68
Lufkin Rule Company 119

M-B Products 108
Majestic Tool & Mfg. Company 105, 122
Marburg Bros., Inc. 92, 103, 111, 124
Martindale Electric Company 117
Masonite Corporation 34
McKenna Metals Company .....
McKinney Tool & Manufacturing Co. ... 123
Mead Specialties, Inc. 99
Michigan Chrome and Chemical Co..... 111
Monarch Machine Tool Company, The .. 30
Muehlhausen Spring Corp. 20

Noble & Stanton 123
Norton Company 16

Ohio Tool Company 6, 7, 123
Oliver Instrument Company 100
O'Neil-Irwin Mfg. Company 115

Package Machinery Co. 88
Paramount Tool Company 123
Peerless Machine Company 23
Phoenix Machine Company 123
Precision Tool Company, The 120
Procunier Safety Chuck Co. 17
Producto Machine Company, The 118
Putnam Tool Company .....Front Cover

Queen City Machine Tool Co. 67

Racine Tool and Machine Company 89
Rane Tool Co., Inc. 122
Robbins Engineering Company 122
Royal Oak Tool & Machine Company .. 122

Savage Tool Company 29
Sav-Way Tool and Machining Co. 63
Scherr Co., Inc., George 31
Schraner, A. P., & Company 123
Schultz & Anderson Co. 75
Scully Jones & Company .....
Severance Tool Company 120
Sheldon Machine Company, Inc. 121
Shore Instrument & Mfg. Co., Inc. 120
Simmons Machine Tool Corp. 33
Skilsaw, Inc. .....
Sommer & Adams Co. 123, 127
South Bend Lathe Works 13
Standard Pressed Steel Company 104
Star Machine & Tool Company 123
Starrett Company, L. S. 85
Strong, Carlisle & Hammond Co. .....

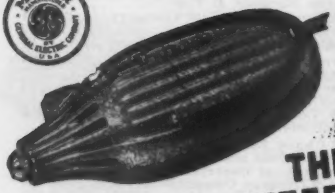
Tamms Silica Company 111
Tannewitz Works, The 117
Taylor Mfg. Company .....
Timken Roller Bearing Company 58
Tomkins-Johnson Company 81
Tool Engineering Service Co., Inc. 109
Tools & Gages, Inc. 105, 123
Tungsten Electric Corp. 87

Ultra Lap Machine Co. 71
United States Treasury 61
Universal Engineering Company 102

Van Norman Machine Tool Co. 8
Variety Machine & Stamping Company 123
Viking Tool & Machine Corp. 125, 126
Vimco Manufacturing Co. 109

Walls Sales Corporation 113
Walton Company 119
Welch Industries, Inc. 54, 55
Western Manufacturing Company 69
Wheelock, Lovejoy & Company .....
Willey's Carbide Tool Company 108
Wittek Manufacturing Company 82

Yohe Supply Co., Wm. S. .....



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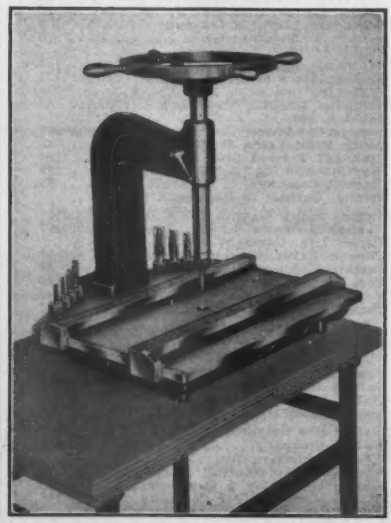

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